

Remediation New Zealand Ltd

Uruti composting facility

Monitoring Programme

Annual Report

2020-2021

Technical Report 2021-81



Working with people | caring for Taranaki



Taranaki Regional Council
Private Bag 713
Stratford

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Executive summary

Remediation New Zealand Ltd (the Company) operates a composting facility and worm farm which produces vermicast. It is located on State Highway 3, Mokau Road, Uruti, Taranaki.

During the monitoring period, the Company demonstrated an overall poor level of environmental performance.

This report for the period July 2020 to June 2021 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds nine resource consents, which include a total of 135 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to allow for discharges to air, and one consent to allow the discharge to land and water. One consent allows the discharge to water and there are six land use consents.

The Council's monitoring programme for the year under review included 19 inspections, 152 water samples and 22 soil samples collected for physicochemical analysis, 1 biomonitoring survey of receiving waters, three sawdust samples, one passive disc ambient air survey and two MultiRae PID surveys. Further inspections were undertaken in relation to complaints from the public.

The monitoring showed that for the discharge to land and water consent 5838-2.2:

- The WTS introduced a sustained concentration of total ammoniacal nitrogen to the Haehanga Stream for the majority of the monitoring period. Concentrations recorded at HHG000103 were in excess of the NPS-FM 2020 annual maximum and annual median national bottom line. Condition 25, on consent 5838-2.2, states the discharge shall not have any significant adverse effect on aquatic life. An exceedance of the national bottom line is defined by the NPS-FM as meaning 20% of the most sensitive species within a water course are impacted regularly.
- The biological monitoring of the Haehanga Stream (Section 2.1.8) concluded with: 'MCI declines significantly downstream of consented activities such as the wetland treatment system discharge as well as the irrigation areas.' This demonstrates that the facility was in breach of consent 5838-2.2, through significant adverse effects to instream biota.
- Surface water monitoring indicated an increasing trend in total ammoniacal nitrogen concentrations that were in excess of the NPS-FM bottom line, annual maximum. This is observed within the unnamed tributary of the Haehanga that receives the WTS discharge, but also in the main stem of the Haehanga Stream below the site's irrigation areas, where Council inspections have shown that a combination of the WTS discharge and over-irrigation of the irrigation area is occurring. This has been shown to affect the much larger Mimitangiatua River, with one incident demonstrating that elevated ammoniacal nitrogen within the Haehanga Stream can and is influencing the Mimitangiatua River. This is an offsite effect from the exercise of this consent.
- *E. coli* monitoring demonstrates the exercise of this consent is increasing the concentration within the Haehanga Stream. An order of magnitude increase in this analyte was recorded between the top and bottom monitoring sites in the catchment. The final monitoring site on the Haehanga Stream, was found to be in breach of the NPS-FM 2020 national bottom line for *E. coli*, for the contact recreation attribute, on two of three occasions monitored.
- Estimated loading of irrigation areas noted some significant discharges of nitrogen to land (>500 kg N/ ha).

- The unauthorised acceptance and utilisation, through composting, of treated sawdust, has resulted in trace concentrations of LOSP treatment chemicals within the irrigation fluid, groundwater (one well) and surface water (multiple occasions).
- In addition, spot samples of the drilling mud (RNZ 1-4) demonstrate that this practice has been ongoing for 15 years, in breach of the consent. Thus the concentrations recorded in this monitoring period may not show the worst case scenario for these compounds. These may have been at a greater concentration in previous monitoring periods. It is noted that in earlier monitoring periods leachate break out was recorded from the drilling mud pad and sawdust was found to be discharged into an unnamed tributary of the Haehanga Stream.
- The spot samples from the drilling mud pad contained elevated barium, sodium, LOSP chemicals and measurable total petroleum hydrocarbons. Certain heavy metals are also elevated when compared to baseline site soil concentrations.
- Groundwater monitoring indicates short term impacts. Chloride impacts are still evident in GND2190.
- Soil monitoring has determined that the new lower irrigation area is partially constructed from material of drilling mud origin.
- Soil chloride results are decreasing.

For the discharges to air consent 5839-2:

- Impacts to air, in the form of offensive odour, beyond the site boundary, have occurred this monitoring period. The Company were given clear advice from its consultant and the Council to mitigate this issue. However, 11 months to partially implement these recommendations, while odour complaints continue, is a considerable period of time.
- The discharge to air consent requires best practice to minimise odour. While progress is occurring in this area, continued adherence to maintaining control of odour sources so they do not create objectionable odour beyond the boundary is required.
- During the reporting year, 83 complaints were received by Council. Objectionable odour was observed by Council investigating officers on five occasions. Enforcement was undertaken.

For the discharge of stormwater from a quarry consent 10063-1:

- The consent was not exercised during this monitoring period.
- Stormwater controls remained functional on the access track.
- Minimal effects were noted through inspections or monitoring.
- The Company was advised that if this were to become operational again, further controls would be required. These would need to be discussed with Council prior to undertaking operations.

In terms of consents relating to culverts:

- Twin culverts (5938-2) in Haehanga allowed for fish passage year round. No significant functional issues were identified throughout the year.
- Single culvert (6212-1) in Haehanga Stream has been worked on by the Company during the monitoring period. To achieve fish passage when the flow is very low has proved difficult, although the Company have been attempting to achieve this. Site inspections indicated that recent works are aiding with fish passage however, further works are still required to ensure fish passage is maintained during summer low flows.
- Single culvert (10547-1) from unnamed tributary to Haehanga Stream. Fish passage was not assessed as the culvert is very long and constitutes a confined space work environment. No performance issues were noted. This culvert leads from a rocky gully to the Haehanga Stream.

- New culvert (10843-1) from newly developed irrigation area. Significant improvement from previous culvert which had been present prior to site operations being extended into this area. Significant works were undertaken by the consent holder. Fish passage is allowed for.

In terms of stream realignment consents:

- The older realignment (6211-1) had no issues reported in this monitoring period. It is well vegetated and not erosion-prone. Riparian planting is lacking and this will be undertaken in due course, in liaison with a land management officer of the Council.
- The stream realignment (10825-1) undertaken in this monitoring period created a new lower irrigation area (L6). The job was undertaken well, with the associated battering to a reasonable standard. Riparian development has begun, with a phased approach adopted by the Company to plant the whole realignment. Pasture is being established.

There were 11 unauthorised incidents recording non-compliance in respect of this consent holder during the period under review. Three letters of explanation were requested, and four abatement notices and 11 infringement notices issued.

During the year, the Company demonstrated a poor level of environmental and administrative performance with the resource consents.

The rationale for this grading by the Council was due to significant non-compliances, both from an environmental and administrative perspective.

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% of the consents, a good level of environmental performance and compliance was achieved.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance remains at a poor level.

This report includes recommendations for the 2021-2022 year.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2020 to June 2021 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Remediation NZ Ltd (the Company). The Company operates a composting and vermiculture facility situated on State Highway 3 at 1460, Uruti, in the Mimitangiatua catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company that relate to discharges to land and water within the Mimitangiatua catchment, and to an air discharge permit held by the Company to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 20th combined annual report by the Council for the Company.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about:

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites through annual programmes;
- the resource consents held by the Company in the Mimitangiatua catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

Section 2 presents the results of monitoring during the period under review, including scientific and technical data.

Section 3 discusses the results, their interpretations, and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2021-2022 monitoring year.

A glossary of common abbreviations and scientific terms, and a bibliography, are presented at the end of the report.

1.1.3 The Resource Management Act 1991 and monitoring

The RMA primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

- a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
- b. physical effects on the locality, including landscape, amenity and visual effects;
- c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

- d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
- e. risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' in as much as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the Company, this report also assigns them a rating for their environmental and administrative performance during the period under review.

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. Administrative performance is concerned with the Company's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

Environmental Performance

High: No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

Good: Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
- Strong odour beyond boundary but no residential properties or other recipient nearby.

Improvement required: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

Poor: Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

High: The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

Good: Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

Improvement required: Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

Poor: Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% of the consents, a good level of environmental performance and compliance was achieved.¹

1.2 Process description

The Company's operations include a composting, quarrying and vermiculture operation at Mokau Road, Uruti, and vermiculture operations at Waitara Road. The Waitara Road site also has a processing facility which blends and refines the finished products. Compliance at the Waitara Road facility is now reported separately.

The Mokau Road, Uruti composting site was established in late 2001, following removal of composting operations from the old Winstone Aggregates quarry site, Manutahi Road, Bell Block (the Company no longer operates at this site). The closure of the composting operations was due to the incompatible nature of the activity with the surrounding land use (nearby residential houses), which resulted in odour incidents. The vermiculture production facilities have been operating at Waitara Road since 1998.

A range of waste streams are processed and converted, via vermiculture and composting, into a marketable biological product that can be used as a fertiliser and or soil conditioner.

¹ The Council has used these compliance grading criteria for more than 17 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

The current site at Uruti accepts a range of waste streams which include paunch grass, poultry waste, poultry mortalities, greenwaste, sheep skin and drilling waste (though acceptance of drilling waste was ceased by 31 December 2020). The acceptable material list is provided in appendix I, consent 5838-2.2.

Further materials have been added to the acceptable material list over time and these materials have been agreed between the Company and the Council prior to acceptance. In certain cases, trials have taken place, to add confidence to the treatment of the proposed composting waste stream.

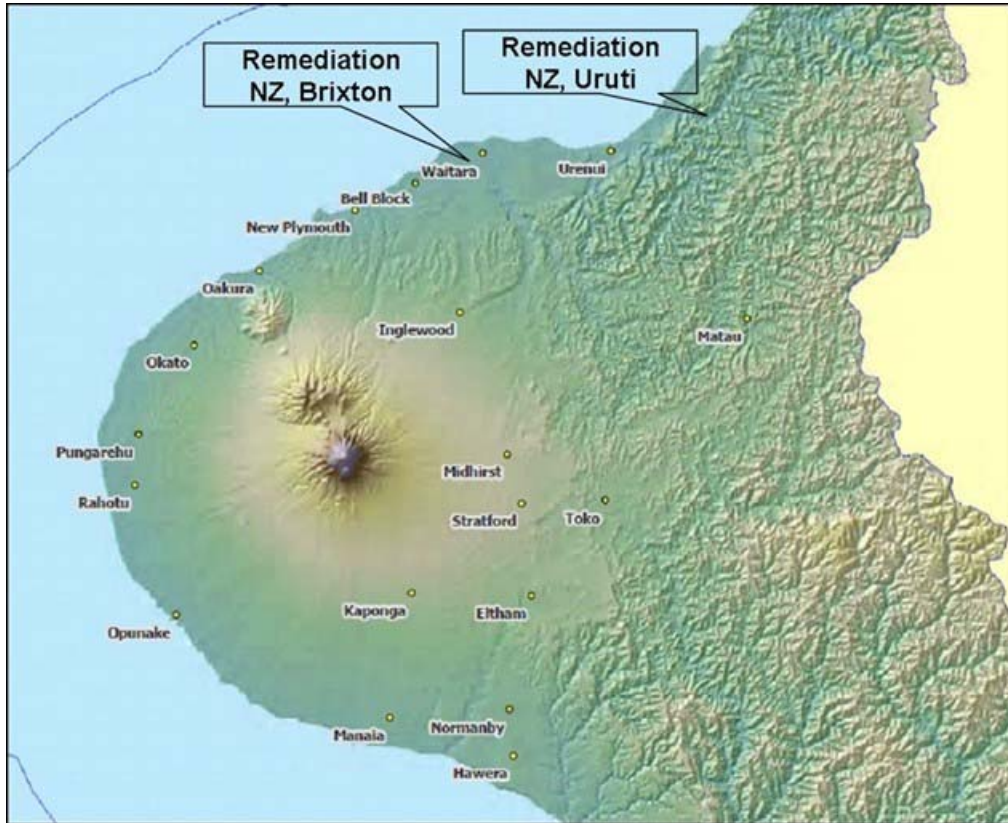


Figure 1 Regional locations of the Company assets Waitara Road, Brixton and Mokau Road, Uruti

The composting operation at the Uruti site generates a significant amount of leachate and contaminated stormwater from three main processing areas. These are the greenwaste pad (Pad 1), the paunch pad (pad 2) and drilling waste pad (pad 3).

Pad 3 holds drilling muds, fluids and cuttings which are mixed with sawdust and/or other organic material such as poultry waste. This is then composted in one very large pile which was turned initially to stimulate the composting process in the initial phase.

Any rainfall runoff and leachate that is generated on pad 3, drains into a series of ponds for treatment referred to as the pond treatment system (PTS). Between each pond is a baffle that skims off any floating hydrocarbons as the leachate passes through. These ponds also treat the leachate and stormwater from pad 1 where greenwaste and sheep skin is routinely composted. The treated liquid from PTS is then irrigated to cut and carry pasture on a number of irrigation areas. The cut pasture is then taken offsite for sale.

Pad 2, the paunch pad, is where paunch from suppliers is delivered. This is one large pond, from where the leachate generated from the paunch is pumped up to the top of a seven-tier constructed wetland. This wetland is planted out with the bulrush raupō which is intended to function as a nitrogen sink for the ammonia-rich paunch leachate. Under dry conditions the water from the bottom pond of the wetland is reticulated back to the top tier of the wetland. Under high flow conditions the wetland discharges the treated stormwater/leachate to a tributary of the Haehanga Stream.

Paunch is routinely fed to the worm beds which are located in this area of the site.

The Company also have a pea gravel quarry within the Uruti site. The quarry has been non-operational this monitoring period.

1.3 Resource consents

The Company holds nine resource consents, the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in Section 3.3 of this report.

A summary of the various consent types issued by the Council is included in Appendix I, as are copies of all permits held by the Company during the period under review.

Please note two consents expired at the end of this monitoring period, with one of them undergoing a renewal (6212-1). The other (6211-1) will not be renewed.

Table 1 Resource consents held by the Company

Consent number	Purpose	Granted	Review	Expires
<i>Air discharge permit</i>				
5839-2	To discharge emissions into the air, namely odour and dust, from composting operations	May 2010	June 2017	June 2018 S.124 Protection
<i>Discharges of waste to land and water</i>				
5838-2.2	To discharge: a) waste material to land for composting; and b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream	August 2015	June 2017	June 2018 S.124 Protection
<i>Land use permits</i>				
5938-2	To use a twin culvert in the Haehanga Stream for vehicle access purposes	September 2015	June 2021	June 2033
6211-1	To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes	September 2003	June 2015	June 2021
6212-1	To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes	September 2003	June 2015	June 2021 S.124 Protection
10547-1	To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed	March 2018	June 2021	June 2033
10825-1*	To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes	June 2020	June 2027	June 2039
10843-1*	To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream. Including associated disturbance of the stream bed	June 2020	June 2027	June 2039
<i>Discharge to water</i>				

Consent number	Purpose	Granted	Review	Expires
10063-1	To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream	March 2015	June 2021	June 2027
*denotes consented activities which were developed throughout this monitoring period				

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

The Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations and seek information from consent holders.

The monitoring programme for the Company site consisted of four primary components.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

The Uruti site was inspected in 19 occasions during the monitoring period (Appendix II). Further visits were also undertaken during monitoring rounds of groundwater and soil. Further visits were necessitated through complaints, generally received afterhours (Section 2.3).

With regard to consents for the discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters.

Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Chemical sampling

The Council undertook compliance sampling across the Company operations at the Uruti facility in the 2020-2021 monitoring period. As the Company holds resource consents specifically related to discharges to land and water, the Council monitors the surface water, groundwater and soil at the Uruti site.

The analytes specifically related to the mediums of surface, groundwater and soil are provided in the following Table 2.

Surface water analysis

Surface water samples were collected from 15 specific monitoring locations on the Haehanga Stream and associated unnamed tributaries (Figures 2 and 4). The samples collected were tested for a range of analytes which are detailed in Table 2.

The Council assessed these 15 surface water locations six times during the monitoring period. A follow up survey was also undertaken in relation to elevation of a certain analyte. In addition, two incidents surveys were also undertaken.

Spot field parameters were collected for field screening purposes. These were collected via a Yellow Springs Instrument (YSi) multi-parameter probe and assessed for the following: pH, dissolved oxygen, conductivity, temperature and oxidation and reduction potential.

Two additional surface water monitoring locations were created on the Mimitangiatua River, to assess for any influence from the Haehanga Stream. This occurred in the final month of the monitoring period.

Groundwater analysis

The Uruti site contains an active groundwater monitoring network, as required by resource consent 5838-2.2. The monitoring well network is comprised of seven wells (Figure 3). The network was monitored quarterly this period and was assessed for the analytes provided in Table 2.

Low-flow sampling is undertaken via a peristaltic pump. Prior to sample collection, Council field staff undertook a well stabilisation procedure. This requires that field parameters (which are assessed through the use of a YSi multiple parameter probe) have stabilised to within 8% over a five minute period, or within three well volumes, prior to the sample being collected.

Soil analysis

Representative soil sampling was undertaken on the site specific irrigation areas (9 areas, Figure 5) to identify any emerging issues that might arise as a direct result of irrigation to these areas. During the period under review, 13.18 ha were available for irrigation, with two samples collected from each irrigation area this monitoring period.

Soil sampling was undertaken by two means. The first was with a soil corer which was inserted to a depth of 350 mm +/- below ground level (bgl), whereby ten soil cores are collected across an irrigated area. The ten cores are then composited to gain one representative sample. The second method was undertaken through a footstool sampler, which removes a surface plug of 70 mm bgl. In this case 20 plugs are collected and combined to gain one representative composite sample.

The rationale for the additional shallow (7 cm bgl) samples were to ascertain for any major difference between the shallow (70 mm) or deeper (350 mm) core.

The analysis undertaken by the Council in respect of the soil is provided in Table 2.

Table 2 Monitoring analyte by medium

Surface Water Analytes	
Calcium Biochemical Oxygen Demand (BOD) Benzene Toluene Ethylene Xylene Temperature Suspended Solids Conductivity Total Petroleum Hydrocarbons (TPH) C ₇ -C ₃₆ C ₇ -C ₉ C ₁₀ -C ₁₄ C ₁₅ -C ₃₆	pH Chloride Potassium Magnesium Un-ionised ammonia Ammoniacal Nitrogen Nitrite-Nitrate Nitrogen Organonitro and phosphorus spelling pesticides screen Hydrogen sulphide screen (total sulphide , un-ionised hydrogen sulphide) Methylene blue activated substances Dibutyltin Tributyltin Triphenyltin
Discharge Analytes (Irrigation pond WTS discharge)	
Un-ionised Ammonia pH Conductivity Total suspended solids Temperature Ammoniacal nitrogen Nitrite-Nitrate Nitrogen Total Calcium Total Magnesium Total Potassium Sodium Absorption Ratio Total Sodium Chloride Total Nitrogen Dissolved Arsenic Dissolved Barium Dissolved Cadmium Dissolved Chromium Dissolved Copper Dissolved Lead	Acid Soluble Lead Dissolved Mercury Dissolved Nickel Dissolved Zinc Total Kjeldahl Nitrogen (TKN) Carbonaceous Biochemical Oxygen Demand Total Petroleum Hydrocarbons (TPH) C ₇ -C ₃₆ Benzene Toluene Ethylene Xylene (BTEX) Acid soluble barium Total Barium Organonitro and phosphorus pesticides screen Hydrogen sulphide screen (total sulphide , un-ionised hydrogen sulphide) Methylene blue activated substances Dibutyltin Tributyltin Triphenyltin
Groundwater Analytes	
Benzene Toluene Ethylene Xylene Chloride Total Petroleum Hydrocarbon (TPH) Total Calcium Total Magnesium Total Sodium	Un-ionised ammonia Ammoniacal Nitrogen Nitrite-Nitrate Nitrogen Total Dissolved Salts Temperature Level Dissolved Barium Acid Soluble barium Organonitro and phosphorus pesticides screen

Soil Analytes	
Calcium	Mercury
Chloride	Zinc
Conductivity	Magnesium
Potassium	Sodium
Moisture factor	Ammoniacal Nitrogen
Sodium Absorption Ratio (SAR)	Nitrite-Nitrate Nitrogen
Arsenic	pH
Cadmium	Total Petroleum Hydrocarbons (TPH)
Chromium	Poly-cyclic aromatic hydrocarbons (PAH)
Copper	BTEX
Lead	Organonitro and phosphorus pesticides screen
Nickel	

1.4.5 Biomonitoring surveys

A biological survey was performed on one occasion in the Haehanga Stream, an associated unnamed tributary, and an offsite reference location, at seven locations this monitoring period. This was undertaken in order to determine whether or not the discharge of treated effluent to land and water, as a process of the exercise of consent, had a detrimental effect on macroinvertebrate and fish communities in the stream. A summary of this survey is provided later in this report in Section 2.1.8.



Figure 2 Site map of operational areas RNZ Uruti

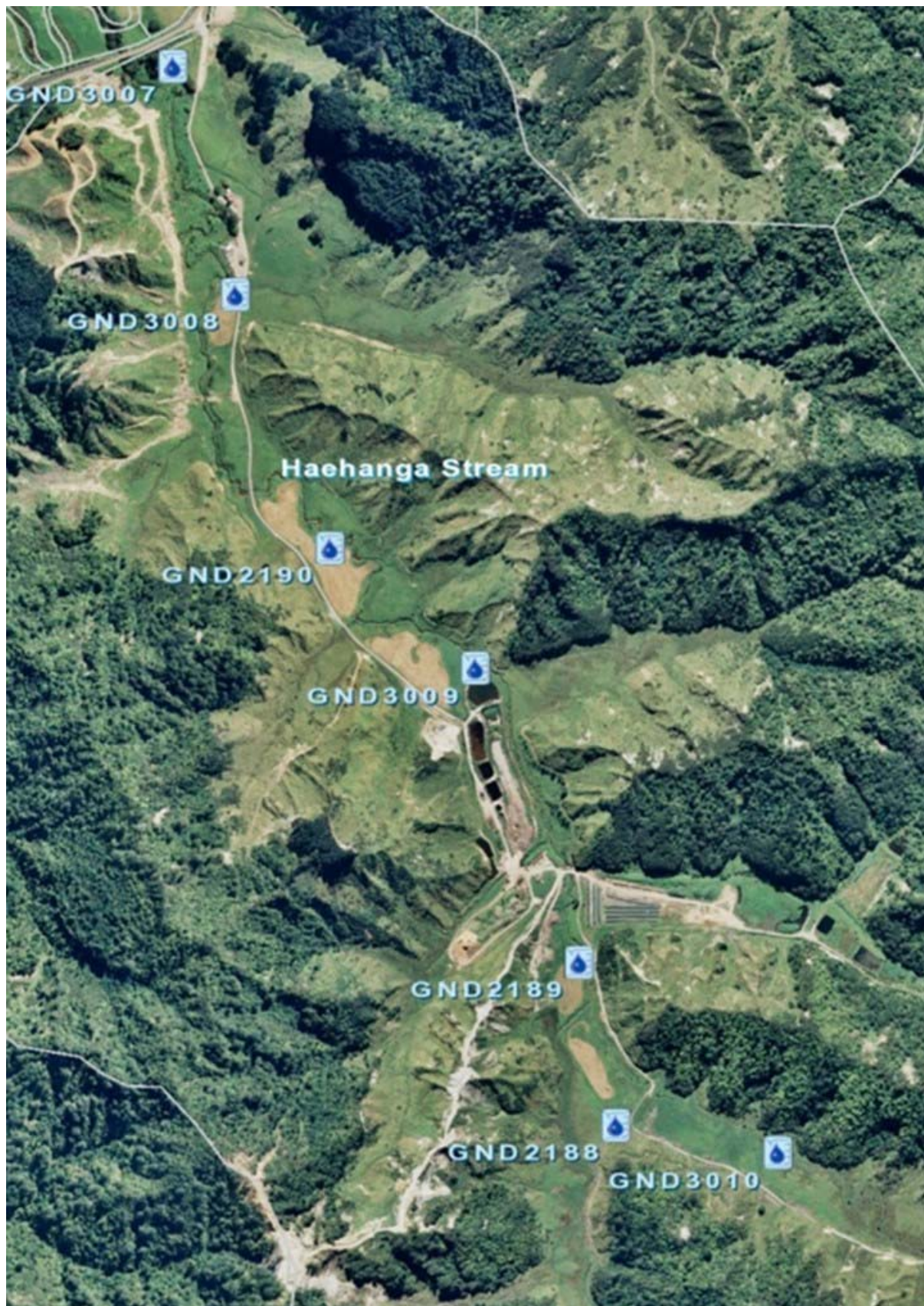


Figure 3 Locations of groundwater monitoring wells RNZ Uruti



Figure 4 Surface water sampling locations RNZ Uruti

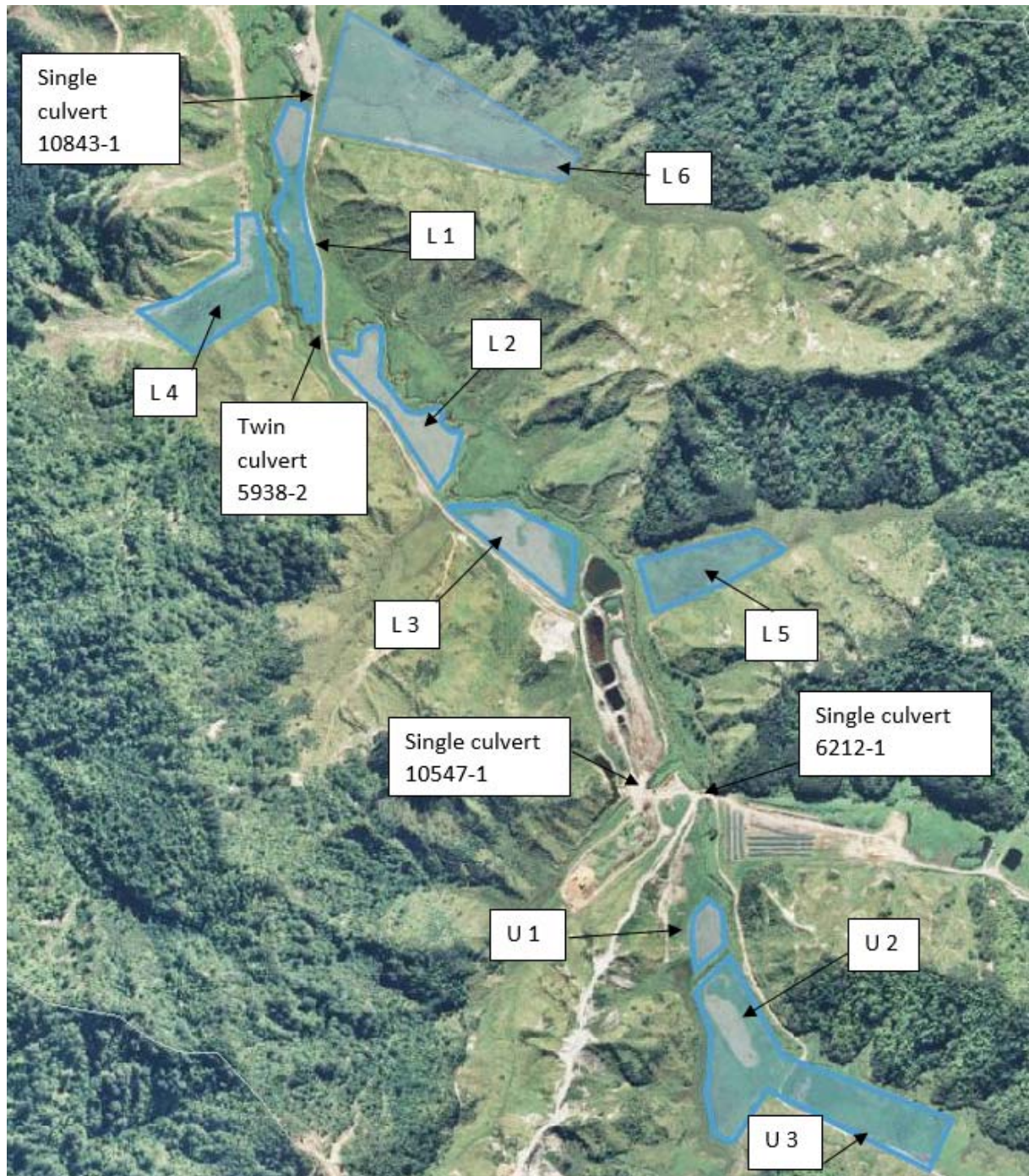


Figure 5 Irrigation areas and culverts RNZ Uruti

2 Results

2.1 Water

2.1.1 Inspections

Monthly inspection notices are included in appendix II.

2.1.2 Results of the discharge monitoring

2.1.2.1 Surface water monitoring – Wetland Treatment System discharge

The Company holds consent 5838-2.2. This allows the discharge of waste material to land for composting and treated stormwater and leachate from composting operations onto and into land, in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream.

In this section of the report, the direct discharge monitoring to the unnamed tributary of the Haehanga Stream is reported (Table 3).

The Wetland Treatment System (WTS) (Figure 2 and Figure 4) functions by pumping primarily ammonia-enriched fluid from the paunch mixing pond, to the top of a multi-tiered wetland treatment system. The wetland has been planted with the bulrush raupō. This is proposed to treat nutrient-enriched water through assimilation, while the dense planting of the raupō may act as a filter. Downstream of the tiered raupō wetland is discharge sample location IND003008.

Table 3 IND003008 wetland treatment system discharge monitoring 2020-2021

Wetland treatment system discharge monitoring 2020-2021 monitoring period	Date	Consent limit 5838-2.2 con 24	14/08/2020	14/10/2020	11/12/2020	25/02/2021	30/04/2021	2/07/2021
Parameter	Time		10:43	10:57	10:18	11:59	9:21	11:55
Free Ammonia as N	g/m ³		0.53	0.34	1.23	0.72	0.132	0.23
pH	pH Units	6-9 pH	7.7	7.6	7.9	8.3	7.8	7.7
Electrical Conductivity (EC)	mS/m		105.7	57.8	63.8	63.2	58.9	73.2
Electrical Conductivity (EC)	µS/cm		1,057	578	638	632	589	732
Total Suspended Solids	g/m ³	<100 g/m ³	16	16	26	63	63	22
Sample Temperature	°C		9.8	18.1	19.1	20.4	13.4	8.8
Total Sodium	g/m ³		-	-	-	-	-	-
Chloride	g/m ³		35	19.8	16.1	33	29	25
Total Ammoniacal-N	g/m ³		60	25	39	10	7.9	30
Total Ammoniacal-N pH 8 equivalent toxicity	g/m ³		40.8	15.3	34.2	16.1	6.0	20.4
Nitrate-N + Nitrite-N	g/m ³		3.5	4.5	1.38	2.5	2.7	3.7
Escherichia coli	cfu / 100 ml		-	-	-	1,000	310	700
Methylene Blue Active Substances (MBAS)	g/m ³		-	-	-	-	-	0.4
Turbidity	NTU		-	-	-	47	32	27
Total Arsenic	g/m ³		-	-	-	-	-	0.0044
Total Cadmium	g/m ³		-	-	-	-	-	< 0.000053
Total Chromium	g/m ³		-	-	-	-	-	0.00091
Total Copper	g/m ³		-	-	-	-	-	0.0039
Total Lead	g/m ³		-	-	-	-	-	0.00109
Total Nickel	g/m ³		-	-	-	-	-	0.0054
Total Zinc	g/m ³		-	-	-	-	-	0.0105

- The WTS was compliant with condition 24 of consent 5838-2.2 on all six occasions.
- Significant ammoniacal nitrogen ($> 10 \text{ g/m}^3$) was recorded on five of six occasions.
- A trace concentration (0.4 g/m^3) of a surfactant (methylene blue activated substance) was recorded 2 July 2021.
- Total heavy metals analysis was included in the final monitoring round and will be instilled in the monitoring programme moving forward².
- Arsenic, chromium, copper, lead, nickel and zinc were reported in the discharge to receiving waters.

2.1.2.2 Surface water monitoring – HHG000103 post mixing zone from WTS discharge

The WTS (IND003008) discharges into the unnamed tributary of the Haehanga Stream. It is then monitored against consent 5838-2.2, condition 25, at surface water monitoring location HHG000103 (Figure 4 and Table 4). This is 40 m downstream from the discharge.

Table 4 Surface water monitoring HHG000103

HHG000103 monitoring 2020-2021	Date	5838-2.2 con 25	14/08/2020	14/10/2020	30/10/2020	11/12/2020	25/02/2021	30/04/2021	2/07/2021
Parameter	Unit		10:54	10:55	14:17	10:15	11:38	9:12	12:01
Free Ammonia as N	g/m^3	≤ 0.025	0.025	0.0025	0.0059	0.0189	0.00051	0.0029	0.0026
Turbidity	NTU		-	-	-	-	13.3	13.5	15.5
pH	pH Units		7.4	7.1	7.2	7.5	7.6	7.6	7.3
pH (field)	pH Units		7.43	7.4	-	-	7.24	-	6.79
Electrical Conductivity (EC)	mS/m		27.6	15.6	17.3	14.4	22.8	21.4	18.9
Electrical Conductivity (EC)	$\mu\text{S/cm}$		276	156	173	144	228	214	189
Total Suspended Solids	g/m^3		5	89	17	210	5	18	14
Sample Temperature	$^{\circ}\text{C}$		9.5	13.1	16	15.9	15.8	10.8	6
Chloride	g/m^3		15.3	13.1	11.3	11.4	10.4	10.2	11.8
Total Ammoniacal-N	g/m^3		6	0.9	1.15	2.1	0.05	0.39	1.05
Total Ammoniacal-N pH 8 equivalent toxicity	g/m^3	$< 0.4^*$	3.093	0.464	0.52	1.173	0.023	0.239	0.398
Dissolved C-Biochemical Oxygen Demand (CBOD ₅)	$\text{g O}_2/\text{m}^3$	≤ 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Escherichia coli	MPN / 100 ml		-	-	450	-	290	170	130
Methylene Blue Active Substances (MBAS)	g/m^3		-	-	-	-	-	-	< 0.1
Dissolved Reactive Phosphorus	g/m^3		-	-	-	-	-	0.5	-
Total Arsenic	g/m^3		-	-	-	-	-	-	< 0.0011
Total Cadmium	g/m^3		-	-	-	-	-	-	< 0.000053
Total Chromium	g/m^3		-	-	-	-	-	-	< 0.00053
Total Copper	g/m^3		-	-	-	-	-	-	0.00189
Total Lead	g/m^3		-	-	-	-	-	-	0.00033

² This will assess for any influence from the boluses which are found in the paunch pond

HHG000103 monitoring 2020- 2021	Date	5838- 2.2 con 25	14/08/2020	14/10/2020	30/10/2020	11/12/2020	25/02/2021	30/04/2021	2/07/2021
Parameter	Unit		10:54	10:55	14:17	10:15	11:38	9:12	12:01
Total Nickel	g/m ³		-	-	-	-	-	-	0.0027
Total Zinc	g/m ³		-	-	-	-	-	-	0.0015
* NPS-FM 2020 ammonia national bottom line annual maximum									

In terms of consent compliance

- On one occasion (14/08/2020) the concentration recorded for free ammonia (NH₃) was on the consent limit (0.025 g/m³).
- Dissolved carbonaceous biochemical oxygen demand was below the laboratory defined limit of detection (LOD) on all seven occasions.
- Ammoniacal nitrogen (pH 8 equivalent toxicity³ annual maximum⁴) failed to achieve the national bottom line on four of seven monitoring occasions. This is not a consent condition *per se*, but is highlighted in this report because the Council will be obliged to give effect to the NPS-FM in future. On three of these four monitoring occasions, ammonia concentrations were found to be in attribute Band C. The fourth (3.09 g/m³, 14/08/2020) sample fell within attribute state D, approaching acute impact level (that is, risk of death) for sensitive species, as defined within the NPS-FM.
- Ammoniacal nitrogen (pH 8 equivalent toxicity) was calculated at 0.309 g/m³ (from 24 samples, over three years from October 2018 – October 2021) placing the site in attribute Band C. As defined by the NPS-FM, this provides for 80% species protection⁵ but may impact regularly on the 20% most sensitive species (i.e. there might be reduced survival of most sensitive species).
- *E. coli* monitoring was undertaken on four of seven rounds, ranging 130-450 MPN/100 ml. NPS-FM attribute state determination was not calculated as there is an insufficient quantity of samples to undertake the calculation⁶.
- Dissolved reactive phosphorus was recorded on one occasion at 0.5 g/m³.
- Methylene Blue activated substances (MBAS) was not found above the LOD.
- Heavy metal screening was undertaken on the final monitoring round. The results indicated the following:
 - Total arsenic, cadmium and chromium were below the LOD.
 - Total copper was recorded marginally above the 90% level of species protection as defined by the ANZG2018⁷.
 - Total lead, nickel and zinc were all found to be within the 99% species protection category, though no hardness modification was undertaken during this calculation.

³ Appendix – Ammonia adjustment calculations: A guide to attributes In Appendix 2 of the National Policy Statement for Freshwater Management 2014 (as amended 2017)

⁴ National Policy Statement for Freshwater Management 2020 Table 5 Ammonia (toxicity) national bottom line annual maximum

⁵ It should be noted that due to the size of the sampling round, the monitoring may not target worst case scenarios, such as late summer afternoons, which have the ability to increase the pH of surface waters. Further work will aim to capture the later afternoon pH readings and ammonia concentration of the surface water.

⁶ The attribute state should be determined using 60 samples over a maximum of five years. MfE 2017, A draft guide to swimming, *E. Coli* and National targets under the national policy statement for freshwater management 2014

⁷ Australian and New Zealand guidelines for freshwater and marine water quality 2018 (ANZG2018) Copper Freshwater

2.1.3 Surface water monitoring Haehanga Stream and associated unnamed tributary

The Haehanga Stream and associated unnamed tributaries were sampled at 15 sites (Figure 4) on six scheduled occasions in the 2020-2021 monitoring period. The results of the six rounds and one smaller, follow up round, are provided in the following tables.

The discharge from the WTS (IND003008) has been included in the results to provide context to the results of the receiving waters (HHG000103). Analytes of total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), were analysed at numerous sites across all monitoring rounds. None were identified above the LOD. As such these have been omitted from the results.

Table 5 Surface water monitoring 14/08/2020

SW1 14/08/2020		NH ₃	pH	pH (field)	EC	EC	TSS	Temp
Site		g/m ³	pH Units	pH Units	mS/m	µS/cm	g/m ³	°C
Consent 5838-2.2 condition11	Time	>0.025						
HHG000090	10:33	0.00017	7.2	7.24	18.2	182	23	10.1
HHG000093	10:20	0.00057	7.2	7.27	19.1	191	7	10.1
HHG000099	10:16	0.00034	7.2	7.4	27.4	274	< 3	10.2
HHG000100	10:12	0.00048	7.1	7.3	22.3	223	5	9.3
HHG000097	11:05	0.00021	7.3	7.51	21.4	214	< 3	9.2
HHG000098	10:45	0.00013	7.3	7.83	16.1	161	4	9.7
IND003008	10:43	0.53	7.7	-	105.7	1,057	16	9.8
HHG000103	10:54	0.025	7.4	7.43	27.6	276	5	9.5
HHG000106	9:59	0.0015	7.1	7.25	26.7	267	-	10
HHG000109	9:29	0.0028	7.1	7.29	25.4	254	-	9.2
HHG000115	9:37	0.0032	7.2	7.27	25	250	-	9.1
HHG000150	9:15	0.0022	7	7.06	27.9	279	11	9.6
HHG000160	9:05	0.0026	7.1	6.99	28.5	285	13	9.6
HHG000165	8:52	0.000128	6.8	7.2	19.9	199	10	9.4
HHG000168	9:00	0.0041	7.3	7.04	28.3	283	10	9.6
HHG000190	8:44	0.0024	7.1	7.23	27.3	273	-	9.9
		Total Sodium	Chloride	Total ammoniacal nitrogen	Total ammoniacal nitrogen pH 8 equivalent toxicity with field pH	NNN	DCBOD	CBOD
Site		g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	g O ₂ /m ³	g O ₂ /m ³
Consent 5838-2.2 condition11	Time		>150		>0.4*		>2.0	
HHG000090	10:33	10.8	9.9	0.054	0.024	0.169	< 1.0	-
HHG000093	10:20	11.5	13.3	0.193	0.087	0.22	< 1.0	-
HHG000099	10:16	-	13.5	0.108	0.056	-	< 1.0	-
HHG000100	10:12	11.9	14.8	0.22	0.105	0.22	< 1.0	-
HHG000097	11:05	-	12	0.065	0.036	0.104	< 1.0	-
HHG000098	10:45	-	11.7	0.038	0.029	-	< 1.0	-
IND003008	10:43	-	35	60	40.816	3.5	-	-
HHG000103	10:54	-	15.3	6	<u>3.093</u>	-	< 1.0	-
HHG000106	9:59	-	22	0.64	0.290	-	< 1.0	-
HHG000109	9:29	-	15.3	1.37	<u>0.656</u>	-	< 1.0	-
HHG000115	9:37	14.6	15.3	1.27	<u>0.608</u>	0.64	< 1.0	-
HHG000150	9:15	16.7	24	1.2	<u>0.517</u>	0.84	< 1.0	-
HHG000160	9:05	17	31	1.27	<u>0.525</u>	0.92	< 1.0	-
HHG000165	8:52	13.1	15.9	0.109	0.049	0.22	< 1.0	-
HHG000168	9:00	16.4	26	1.13	<u>0.467</u>	0.85	< 1.0	-
HHG000190	8:44	-	27	1.1	<u>0.498</u>	-	-	< 1.0

*= National Policy Statement Freshwater Management (NPS-FM) ammonia national bottom line maximum

Surface water monitoring round one (14/08/2020, Table 5) indicated the following:

- Un-ionised ammonia was found to be on the consent limit (0.025 g/m³) at site HHG000103. For a breach of consent to be established, this must exceed 0.025 g/m³.
- Total ammoniacal nitrogen (NH₄) results were adjusted to a pH of 8 to determine equivalent toxicity (utilising the field pH) as required by the NPS-FM. This indicated a concentration that failed to achieve the national bottom line (annual maximum 0.4 g/m³) at seven monitoring sites (but noting the NPS-FM does not form part of the Company's resource consent).
- pH field results have been included in this data when collected, to enable calculation of pH-adjusted ammoniacal-nitrogen as defined in the NPS-FM.
- Electrical conductivity indicated an increasing concentration down catchment.
- Chloride concentration increased down catchment, though no site was in breach of consent.
- Dissolved carbonaceous biochemical oxygen demand (DCBOD) was below the laboratory defined limit of detection (LOD) at monitoring sites.

Table 6 Surface water monitoring 14/10/2020

SW2 14/10/2020		NH ₃	pH	pH (field)	EC	EC	TSS	Temp
Site		g/m ³	pH Units	pH Units	mS/m	µS/cm	g/m ³	°C
Consent 5838-2.2 condition11	Time	>0.025						
HHG000090	10:43	< 0.00003	7.1	7.33	13.7	137	6	12.9
HHG000093	10:31	0.00008	7.2	7.24	13.8	138	7	12.3
HHG000099	10:23	0.00043	7.3	7.37	18.7	187	10	12.6
HHG000100	10:18	0.00079	7.2	7.41	16.3	163	36	12.3
HHG000097	11:28	0.00016	7.3	7.4	16.5	165	210	11.7
HHG000098	11:00	0.00014	7.1	7.34	15.8	158	177	11.7
IND003008	10:57	0.34	7.6	-	57.8	578	16	18.1
HHG000103	10:55	0.0025	7.1	7.4	15.6	156	89	13.1
HHG000106	10:11	0.00078	7.1	7.41	21.3	213	-	14
HHG000109	9:38	0.0037	7.6	7.23	17.2	172	-	12.1
HHG000115	9:45	0.00133	7.2	7.21	17.2	172	-	12
HHG000150	9:28	0.0011	7.1	7.13	17.9	179	16	12.1
HHG000160	9:06	0.0022	7	7.06	18.7	187	20	12.2
HHG000165	8:58	0.00014	7.1	7.2	16.4	164	6	12
HHG000168	9:19	0.0034	7.3	7.11	18.5	185	20	12.3
HHG000190	8:48	0.00175	7	7.22	18.6	186	-	12.4
		Total Sodium	Chloride	NH ₄	Total ammoniacal nitrogen pH 8 equivalent toxicity with field pH	NNN	DCBOD	CBOD
Site		g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	g O ₂ /m ³	g O ₂ /m ³
Consent 5838-2.2 condition11	Time		>150		>0.4*		>2.0	
HHG000090	10:43	10.4	9.6	< 0.010	0.002	0.126	< 1.0	-
HHG000093	10:31	10.2	10.7	0.024	0.011	0.122	< 1.0	-
HHG000099	10:23	-	12.7	0.085	0.044	-	< 1.0	-
HHG000100	10:18	10.2	12.4	0.21	0.108	0.103	< 1.0	-
HHG000097	11:28	-	11.2	0.039	0.020	0.034	< 1.0	-
HHG000098	11:00	-	12.2	0.051	0.024	-	< 1.0	-
IND003008	10:57	-	19.8	25	15.337	4.5	-	-
HHG000103	10:55	-	13.1	0.9	<u>0.464</u>	-	< 1.0	-
HHG000106	10:11	-	12.4	0.23	0.119	-	<u>3.3</u>	-
HHG000109	9:38	-	13.5	0.41	0.186	-	< 1.0	-
HHG000115	9:45	10.9	13.6	0.38	0.172	0.187	< 1.0	-
HHG000150	9:28	11.2	15.6	0.39	0.168	0.24	< 1.0	-
HHG000160	9:06	11.5	16.6	0.93	<u>0.401</u>	0.29	< 1.0	-
HHG000165	8:58	11.3	15.2	0.05	0.023	0.074	< 1.0	-
HHG000168	9:19	12	16.9	0.84	0.362	0.27	< 1.0	-
HHG000190	8:48	-	16.7	0.78	0.353	-	-	< 1.0

*=NPS-FM ammonia national bottom line maximum

Surface water monitoring round 2 (14/10/2020, Table 6), indicated the following;

- Un-ionised ammonia was found to be compliant with the consent across all monitoring sites.
- A noticeable concentration of suspended solids was recorded at site HHG000097, though the onsite inspector noted that a natural slip, further up the catchment, had likely caused the elevation.
- Temperature monitoring indicated the WTS discharge (IND003008) elevated the receiving waters of the unnamed tributary of the Haehanga Stream by 1.7°C, between sites HHG000098 and 103 respectively.
- Chloride concentrations were in compliance across all monitoring sites.
- pH 8 adjusted total ammoniacal nitrogen to determine equivalent toxicity (utilising field pH) was recorded marginally above the NPS-FM national bottom line (annual maximum) at two monitoring sites. HHG000103 and 160 respectively.
- Dissolved carbonaceous biochemical oxygen demand (DCBOD) was found above the consent limit ($>2.0 \text{ g O}_2/\text{m}^3$) at HHG000106. The remaining sites were below the LOD.

Table 7 Follow up surface water monitoring 30/10/2020

SW 2 follow up 30/10/2020	Site	Consent 5838-2.2	HHG000100	HHG000103	U/S culvert 10547-1	HHG000106	HHG000109	HHG000150
Parameter	Time	con	14:21	14:17	14:30	1:53	13:42	15:03
Free Ammonia as N	g/m^3	>0.025	0.00092	0.0059	0.00078	0.0023	0.0024	0.0018
Turbidity	NTU		-	-	0.17	13.8	10.8	-
pH	pH Units		7.3	7.2	7.5	7.5	7.4	7.3
Electrical Conductivity (EC)	mS/m		17.4	17.3	19.9	21	18.5	19.3
Electrical Conductivity (EC)	$\mu\text{S}/\text{cm}$		174	173	199	210	185	193
Total Suspended Solids	g/m^3		14	17	-	-	-	12
Sample Temperature	°C		17.5	16	18.2	18.5	16.6	16.8
Total Sodium	g/m^3		-	-	-	-	-	12.7
Chloride	g/m^3	>150	11.6	11.3	9	11.3	12.6	15.6
Total Ammoniacal-N	g/m^3		0.136	1.15	0.065	0.21	0.32	0.3
Total Ammoniacal-N pH 8 equivalent toxicity with lab pH		$>0.4^*$	0.07	<u>0.52</u>	0.04	0.12	0.16	0.14
Nitrate-N + Nitrite-N	g/m^3		0.078	-	-	-	-	0.28
Dissolved C- Biochemical Oxygen Demand (DCBOD)	$\text{g O}_2/\text{m}^3$	>2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
<i>E. coli</i>	MPN / 100 ml		1,300	450	1,300	1,300	400	1,100
*=NPS-FM ammonia national bottom line annual maximum								

- The consent breach of DCBOD ($3.3 \text{ g O}_2/\text{m}^3$), recorded at site HHG000106, in the previous monitoring round (14/10/2020, Table 4), prompted a follow up sample round (Table 7).
- No consented parameters were breached during the follow up sampling round. However, the concentration of pH 8 adjusted total ammoniacal nitrogen at HHG000103, was in breach of the NPS-FM bottom line, annual maximum.
- *E. coli* analysis was elevated across all six sample sites.

Table 8 Surface water monitoring 11/12/2020

SW 3 11/12/2020		NH ₃	pH	EC	EC	TSS	Temp	Total Sodium
Time	Site	g/m ³	pH Units	mS/m	µS/cm	g/m ³	°C	g/m ³
Consent 5838-2.2 condition11		>0.025						
HHG000090	11:38	0.00011	7.4	12	120	13	16.7	9.5
HHG000093	11:08	0.00061	7.4	12.4	124	21	16.4	9.7
HHG000099	10:58	0.00034	7.5	16.6	166	30	17.6	-
HHG000100	10:52	0.00064	7.4	14	140	36	16.5	9.6
HHG000097	10:36	0.00018	7.3	13	130	620	14.8	-
HHG000098	10:23	0.00016	7.1	11.3	113	1,240	15	-
IND003008	10:18	1.23	7.9	63.8	638	26	19.1	-
HHG000103	10:15	0.0189	7.5	14.4	144	210	15.9	-
HHG000106	10:01	0.0013	7.5	19.5	195	-	16.7	-
HHG000109	9:23	0.0024	7.2	14.9	149	-	15.4	-
HHG000115	9:17	0.0042	7.5	14.8	148	-	15.4	10.4
HHG000150	9:01	0.0031	7.3	15.6	156	61	15.2	10.8
HHG000160	8:47	0.004	7.4	15.9	159	83	15.2	11
HHG000165	8:39	0.00053	7.3	15.2	152	880	15.4	11.7
HHG000168	8:36	0.003	7.3	15.8	158	69	15.2	11
HHG000190	8:07	0.0024	7.3	15.7	157	-	15.2	-
				Total ammoniacal nitrogen pH 8 equivalent toxicity with lab pH				
Site		Chloride g/m ³	Total ammoniacal nitrogen g/m ³	NNN g/m ³	DCBOD g O ₂ /m ³	CBOD g O ₂ /m ³		
Consent 5838-2.2 condition11	Time	>150		>0.4*		>2.0		
HHG000090	11:38	9.8	0.015	0.008	0.155	< 1.0	-	
HHG000093	11:08	10.3	0.08	0.041	0.155	< 1.0	-	
HHG000099	10:58	10.5	0.031	0.017	-	< 1.0	-	
HHG000100	10:52	10.8	0.084	0.043	0.125	< 1.0	-	
HHG000097	10:36	10.1	0.037	0.018	0.029	< 1.0	-	
HHG000098	10:23	10.6	0.05	0.022	-	< 1.0	-	
IND003008	10:18	16.1	39	34.211	1.38	-	-	
HHG000103	10:15	11.4	2.1	1.173	-	< 1.0	-	
HHG000106	10:01	9.7	0.142	0.079	-	< 1.0	-	
HHG000109	9:23	10.9	0.52	0.235	-	< 1.0	-	
HHG000115	9:17	11.4	0.5	0.279	0.18	< 1.0	-	
HHG000150	9:01	13.1	0.53	0.254	0.21	< 1.0	-	
HHG000160	8:47	13.8	0.56	0.289	0.23	< 1.0	-	
HHG000165	8:39	13.3	0.097	0.046	0.095	< 1.0	-	
HHG000168	8:36	13.8	0.52	0.249	0.22	< 1.0	-	
HHG000190	8:07	14	0.47	0.225	-	-	< 1.0	
*NPS-FM ammonia national bottom line maximum / No field pH collected								

The 11 December 2020 surface water monitoring round (Table 8) indicated the following:

- Un-ionised ammonia remained below the consent limit at all stream monitoring sites, although a significant concentration in the discharge from the WTS (IND003008) was found.

Table 9 Surface water monitoring 25/02/2021

SW4 25/02/2021		NH ₃	Turbidity	pH	pH (field)	EC	EC	TSS	Temp	Total Sodium
Site		g/m ³	NTU	pH Units		mS/m	µS/cm	g/m ³	°C	g/m ³
Consent 5838-2.2 condition11	Time	>0.025								
HHG000090	11:40	< 0.00008	3	7.3	n/s	19.8	198	11	18.9	11.8
HHG000093	11:32	0.00061	6.4	7.5	7.04	26.1	261	6	17.8	15.3
HHG000099	n/s									
HHG000100	11:22	0.0018	10	7.4	7.06	38.1	381	7	17.6	23
HHG000097	12:12	0.00111	26	7.2	7.13	22.3	223	31	15.3	-
HHG000098	11:47	0.00071	7.2	7.6	7.54	22.4	224	5	17.3	-
IND003008	11:59	0.72	47	8.3	n/s	63.2	632	63	20.4	-
HHG000103	11:38	0.00051	13.3	7.6	7.24	22.8	228	5	15.8	-
HHG000106	11:14	0.0162	61	7.1	6.86	55.5	555	-	18.7	-
HHG000109	10:51	0.0019	16.4	7.2	7.01	45.4	454	-	18.3	-
HHG000115	10:58	0.014	16.1	7.3	6.97	57.9	579	-	18.4	43
HHG000150	10:27	0.00029	6.4	7.2	6.91	61.6	616	3	19.4	48
HHG000160	10:18	0.00093	8	7.4	6.95	46.4	464	9	19.2	31
HHG000165	n/s									
HHG000168	10:12	0.00062	9	7.2	6.94	47.1	471	24	19.1	29
HHG000190	9:42	0.0007	11	7.3	6.81	43.5	435	-	17.7	-
		Chloride	Total ammoniacal nitrogen	Total ammoniacal nitrogen pH 8 equivalent toxicity with field pH	NNN	DCBOD	CBOD	MBAS	E. coli	
Site		g/m ³	g/m ³	g/m ³	g/m ³	g O ₂ /m ³	g O ₂ /m ³	g/m ³	cfu / 100ml	
Consent 5838-2.2 condition11	Time	>150		>0.4*		>2.0				
HHG000090	11:40	8.7	< 0.010	0.002	< 0.002	< 1.0	-	0.1	320	
HHG000093	11:32	21	0.06	0.025	0.045	< 1.0	-	-	220	
HHG000099	n/s									
HHG000100	11:22	47	0.23	0.099	0.49	< 1.0	-	-	270	
HHG000097	12:12	10.5	0.24	0.103	0.29	< 1.0	-	-	12,000	
HHG000098	11:47	9.9	0.053	0.030	-	< 1.0	-	-	1,500	
IND003008	11:59	33	10	16.129	2.5	-	-	-	1,000	
HHG000103	11:38	10.4	0.05	0.023	-	< 1.0	-	-	290	
HHG000106	11:14	88	3.8	<u>1.467</u>	-	< 1.0	-	-	13,000	
HHG000109	10:51	65	0.35	0.145	-	< 1.0	-	-	800	
HHG000115	10:58	88	1.96	<u>0.780</u>	0.45	< 1.0	-	-	900	
HHG000150	10:27	113	0.047	0.019	0.81	< 1.0	-	0.2	170	
HHG000160	10:18	73	0.094	0.037	0.35	< 1.0	-	-	200	
HHG000165	n/s									
HHG000168	10:12	66	0.099	0.039	0.21	1.1	-	-	30	
HHG000190	9:42	64	0.095	0.037	-	-	1.3	0.2	3,400	
*NPS-FM ammonia national bottom line maximum n/s = not sampled										

Surface water monitoring undertaken during February 2021 (Table 9) indicated the following:

- All surface water monitoring sites were compliant with the consent concentration for un-ionised ammonia. Of note was the elevated concentration within the WTS discharge.
- pH results indicated the WTS held the most elevated concentration (pH 8.3), which would have likely further increased throughout the afternoon.
- Chloride remained compliant across all monitoring sites.
- Total ammoniacal nitrogen, when calculated for pH 8 (for equivalent toxicity assessment with the field pH results), indicated that two sites, HHG00106 and 109 failed to achieve the NPS-FM bottom line, annual maximum.
- Dissolved carbonaceous biochemical oxygen demand (DCBOD) remained below the consent limit across all sites.
- Methyl blue activated substances (MBAS) (surfactant monitoring) were included in this monitoring round due to a report from the member of the public concerning foaming in the mouth of the Haehanga Stream. Prior to the confluence with the Mimitangiatua River. This was identified at three locations, HHG000090, 150 and 190.
- *E. coli* monitoring indicated a range of results down the length of the Haehanga catchment. The most elevated (13,000 MPN/100 ml) was recorded at HHG000106, followed by HHG000097 (12,000 MPN/100 ml).

Table 10 Surface water monitoring 30/04/2021

SW5 30/04/2021		NH ₃ g/m ³	Turbidity NTU	pH pH Units	EC mS/m	EC µS/cm	TSS g/m ³	Temp °C	Total Sodium g/m ³
Site									
Consent 5838-2.2 condition11	Time	>0.025							
		<							
HHG000090	9:07	0.00003	8.5	7.2	18.7	187	16	11.2	11.5
HHG000093	9:02	0.00036	3.6	7.4	19.7	197	< 3	11	11.9
HHG000099	8:58	0.00025	9.2	7.3	28.2	282	7	10.5	-
HHG000100	8:52	0.00032	5.4	7.2	23.3	233	4	10.9	12.5
HHG000097	9:45	0.00063	12.5	7.6	22.3	223	11	10.6	-
HHG000098	9:03	0.0006	14.8	7.4	21.4	214	11	10.5	-
IND003008	9:21	0.132	32	7.8	58.9	589	63	13.4	-
HHG000103	9:12	0.0029	13.5	7.6	21.4	214	18	10.8	-
HHG000106	8:42	0.0022	8.6	7.2	28.1	281	-	11.7	-
HHG000109	8:28	0.00065	8.6	7.3	24.8	248	-	11.7	-
HHG000115	8:22	0.00063	10.7	7.2	24.7	247	-	10.8	14.7
HHG000150	8:20	0.00048	11.1	7.1	28	280	7	10.3	17.1
HHG000160	8:00	0.0004	14.2	7	28.5	285	11	11.3	17.5
HHG000165	8:14	0.00024	25	6.7	26.5	265	32	12	15.7
HHG000168	8:07	0.00081	10.3	7.3	29.4	294	9	11.4	17.4
HHG000190	7:38	0.00049	11.8	7.2	28.4	284	-	11.3	-
		Chloride	Total ammoniacal nitrogen	Total ammoniacal nitrogen pH 8 equivalent toxicity with lab pH	NNN	DRP	DCBOD	CBOD	<i>E. coli</i>
Site		g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	g O ₂ /m ³	g O ₂ /m ³	cfu / 100 ml
Consent 5838-2.2 condition 11	Time	>150		>0.4*			>2.0		
						<			
HHG000090	9:07	9	< 0.010	0.002	0.049	0.004	< 1.0	-	130
HHG000093	9:02	11.4	0.072	0.037	0.11	-	< 1.0	-	65
HHG000099	8:58	12.5	0.067	0.032	-	-	< 1.0	-	3,000
HHG000100	8:52	14.3	0.097	0.044	0.156	-	< 1.0	-	1,100
HHG000097	9:45	9.1	0.081	0.050	0.153	-	< 1.0	-	120
HHG000098	9:03	9.2	0.139	0.072	-	-	< 1.0	-	250
IND003008	9:21	29	7.9	6.031	2.7	-	-	-	310
HHG000103	9:12	10.2	0.39	0.239	-	0.5	< 1.0	-	170
HHG000106	8:42	20	0.65	0.294	-	0.014	< 1.0	-	1,400
HHG000109	8:28	16.5	0.162	0.078	-	-	< 1.0	-	1,000
HHG000115	8:22	17.1	0.185	0.084	0.33	-	< 1.0	-	1,400
HHG000150	8:20	27	0.2	0.086	0.47	0.044	< 1.0	-	2,700
HHG000160	8:00	29	0.2	0.083	0.54	-	< 1.0	-	1,200
HHG000165	8:14	19.1	0.23	0.087	0.72	-	< 1.0	-	600
HHG000168	8:07	29	0.2	0.096	0.61	0.035	< 1.0	-	680
HHG000190	7:38	28	0.158	0.071	-	0.035	-	< 1.0	1,000

*NPS-FM ammonia national bottom maximum

The April 2021 surface water monitoring round indicated the following (Table 10);

- Un-ionised ammonia concentrations were below the consent limit ($<0.025 \text{ g/m}^3$) across all surface water sites. The WTS discharge contained a more elevated concentration of this analyte.
- Chloride and DCBOD were well below the consent limit.
- Total ammoniacal nitrogen results were below the NPS-FM annual maximum, across all sites. It is noted that this was the first monitoring round of the period not to exceed the NPS-FM bottom line for (pH 8 equivalent toxicity, lab pH) total ammoniacal nitrogen, in surface water.
- Dissolved reactive phosphorus (DRP) monitoring indicated a significant concentration (0.5 g/m^3) originating from the unnamed tributary of the Haehanga Stream at HHG000103. Further monitoring will seek to assess the variation and source of this analyte over time. DRP at the up-gradient (reference) site (HHG00090) was recorded below the LOD.
- *E. coli* results indicated significant concentrations when compared to the reference sites of HHG000090 and 97. The higher end of the results (2,700-3,000 MPN/100 ml) were found on the main stem of the Haehanga Stream at sites HHG000099 and 150 respectively.

Table 11 Surface water monitoring 02/07/2021

SW 6 2/07/2021		NH ₃	Turbidity	pH	pH (field)	EC	EC	TSS	Temperature	Total Sodium
Site		g/m ³	NTU	pH Units	pH units	mS/m	µS/cm	g/m ³	°C	g/m ³
Consent 5838-2.2 condition 11	Time	>0.25								
HHG000090	11:40	0.0001	8.70	7.10	6.96	15.5	155.0	7.0	4.8	10.5
HHG000093	11:23	0.0003	12.40	7.00	7.01	16.5	165.0	9.0	5.3	10.7
HHG000099	11:22	0.0002	7.50	7.20	7.04	24.3	243.0	6.0	4.6	-
HHG000100	11:16	0.0005	11.30	7.10	7.19	19.8	198.0	11.0	5.3	10.9
HHG000097	12:10	0.0002	13.10	7.20	6.97	18.7	187.0	11.0	6.4	-
HHG000098	11:52	0.0002	9.10	7.20	6.94	17.1	171.0	5.0	5.9	-
IND003008	11:55	0.2300	27.00	7.70	7.7**	73.2	732.0	22.0	8.8	-
HHG000103	12:01	0.0026	15.50	7.30	6.79	18.9	189.0	14.0	6.0	-
HHG000106	11:10	0.0011	76.00	7.30	7.54	25.7	257.0	-	6.6	-
HHG000109	10:31	0.0010	12.30	7.30	6.77	21.1	211.0	-	5.3	-
HHG000115	10:24	0.0008	10.70	7.20	6.91	21.0	210.0	-	5.1	12.2
HHG000150	10:11	0.0009	10.70	7.10	6.67	22.9	229.0	7.0	5.5	13.9
HHG000160	10:12	0.0091	11.80	7.20	6.66	29.9	299.0	9.0	5.7	16.3
HHG000165	10:00	0.0001	7.70	6.50	6.57	23.4	234.0	6.0	6.2	13.7
HHG000168	9:48	0.0054	11.30	7.10	6.60	29.7	297.0	14.0	5.2	15.7
HHG000190	8:51	0.0094	13.60	7.30	6.72	28.8	288.0	-	6.2	-
US/ Mimi	12:53	0.0001	4.70	7.10	7.08	10.4	104.0	-	7.6	-
D/S Mimi	13:07	0.0002	5.20	6.80	6.94	11.3	113.0	-	7.6	-
				Total ammoniacal nitrogen pH 8 equivalent toxicity with field pH						
		Chloride	Total ammoniacal nitrogen		NNN	DCBOD	CBOD	MBAS	E. coli	Propiconazole
		g/m ³	g/m ³	g/m ³	g/m ³	g O ₂ /m ³	g O ₂ /m ³	g/m ³	cfu / 100 ml	g/m ³
Consent 5838-2.2 condition 11		>150		>0.4*		>2.0				NZ EPA EELs >0.0001 mg/l
HHG000090	11:40	9.90	0.08	0.03	0.2	< 1.0	-	< 0.1	80	< 0.00004
HHG000093	11:23	11.70	0.24	0.10	0.3	< 1.0	-	-	40	-
HHG000099	11:22	11.50	0.12	0.05	-	< 1.0	-	-	1,900	-
HHG000100	11:16	13.40	0.28	0.13	0.3	< 1.0	-	-	700	-
HHG000097	12:10	10.50	0.07	0.03	0.1	< 1.0	-	< 0.1	120	-
HHG000098	11:52	11.00	0.09	0.04	-	< 1.0	-	-	120	-
IND003008	11:55	25.00	30.00	20.41	3.7	-	-	0.4	700	-
HHG000103	12:01	11.80	1.05	<u>0.40</u>	-	< 1.0	-	< 0.1	130	-
HHG000106	11:10	14.80	0.42	0.23	-	< 1.0	-	< 0.1	320	< 0.00004
HHG000109	10:31	14.40	0.42	0.16	-	< 1.0	-	-	70	-
HHG000115	10:24	14.80	0.42	0.17	0.4	< 1.0	-	-	150	-
HHG000150	10:11	20.00	0.48	0.18	0.5	< 1.0	-	< 0.1	200	< 0.00004
HHG000160	10:12	28.00	4.30	<u>1.59</u>	0.6	< 1.0	-	-	800	0.00009
HHG000165	10:00	17.70	0.20	0.07	0.3	< 1.0	-	-	360	< 0.00004
HHG000168	9:48	27.00	3.80	<u>1.41</u>	0.6	< 1.0	-	-	600	0.00008
HHG000190	8:51	26.00	3.40	<u>1.29</u>	-	-	2.8	< 0.1	500	<u>0.0001</u>
US/ Mimi	12:53	10.60	0.04	0.02	-	-	< 1.0	< 0.1	160	< 0.00004
D/S Mimi	13:07	11.50	0.18	0.07	-	-	1.7	< 0.1	190	< 0.00004
		Tebuconazole	Total Arsenic	Total Cadmium	Total Chromium	Total Copper	Total Lead	Total Nickel	Total Zinc	
Site		g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	g/m ³	
Consent 5838-2.2 condition 11	Time	NZ EPA EELs > 0.00024 mg/l	>0.0024 g/m ³	>0.0002 g/m ³	>0.001 g/m ³	>0.0014 g/m ³	>0.0034 g/m ³	>0.011 g/m ³	>0.008 g/m ³	
HHG000090	11:40	< 0.00004	< 0.0011	< 0.000053	< 0.00053	0.00117	0.0004	0.00199	< 0.0011	
HHG000093	11:23	-	-	-	-	-	-	-	-	
HHG000099	11:22	-	-	-	-	-	-	-	-	
HHG000100	11:16	-	-	-	-	-	-	-	-	
HHG000097	12:10	-	< 0.0011	< 0.000053	0.00058	<u>0.0021</u>	0.0005	0.0032	0.0017	
HHG000098	11:52	-	-	-	-	-	-	-	-	
IND003008	11:55	-	0.0044	< 0.000053	0.00091	0.0039	0.0011	0.0054	0.0105	
HHG000103	12:01	-	< 0.0011	< 0.000053	< 0.00053	<u>0.00189</u>	0.0003	0.0027	0.0015	
HHG000106	11:10	< 0.00004	-	-	-	-	-	-	-	
HHG000109	10:31	-	-	-	-	-	-	-	-	
HHG000115	10:24	-	-	-	-	-	-	-	-	
HHG000150	10:11	< 0.00004	-	-	-	-	-	-	-	
HHG000160	10:12	0.00012	-	-	-	-	-	-	-	
HHG000165	10:00	< 0.00004	-	-	-	-	-	-	-	
HHG000168	9:48	0.00012	-	-	-	-	-	-	-	
HHG000190	8:51	0.00011	0.0021	< 0.000053	0.00067	<u>0.00184</u>	0.0005	0.0029	0.0021	
US/ Mimi	12:53	< 0.00004								
D/S Mimi	13:07	< 0.00004								
*NPS-FM ammonia national bottom line maximum / Heavv metals compared ANZG 2018 95% protection/** Lab pH										

A number of additional analytes (Table 11) were added to the final surface water monitoring round. Only analytes which were detected above the LOD were included in this data set.

Un-ionised ammonia concentrations were below the consent limit across all surface water sites. The WTS contained a more elevated concentration of this analyte. Instream dilution negated the potential for a consent breach at the immediate downstream compliance point HHG000103.

Chloride concentrations were well below the consent limit across all monitoring sites, while for DCBOD, monitored sites were below the LOD. However, in the case of non-filtered carbonaceous biochemical oxygen demand, at site HHG000190, 2.8 g O₂/m³ was recorded, which breaches the consent.

Total ammoniacal nitrogen (equivalent toxicity to pH 8 utilising field pH) recorded four sites which were above the NPS-FM national bottom line. Three of those sites held a concentration which, according to the NPS-FM, suggests an impact to the 20% most sensitive species in the water course. This is the 80% species protection category, attribute Band C whereas Band B, provides for 95% protection.

It should be noted that the field pH results were (bar HHG000106) all sub or close to pH 7. This reduced the un-ionised ammonia toxicity. The lower monitoring sites of HHG000160, 168 and 190 held elevated ammoniacal nitrogen, at a concentration which could cause acute death to sensitive instream species according to the NPS-FM.

E. coli results ranged from 40-1,900 MPN/100 ml. Noted was the significant increase between sites HHG000093 and 99.

Organonitro and phosphorus pesticide screening was conducted on the surface water. Two azole based pesticides (fungicides), propiconazole and tebuconazole were recorded at measurable concentrations at three locations, in the lower reaches of the Haehanga Stream. In the case of propiconazole at site HHG000190, the concentration recorded was equal to the Environmental Exposure Limit (EEL) as defined by the NZEPA.

Heavy metals analysis indicated that only copper was marginally above the 95% species protection limit. However, consideration should be given that elevated copper can be naturally occurring in Taranaki soils. It is noted that the reference location, HHG000090, was also very close to the limit for 95% protection.

2.1.3.1 Surface water discussion

Six surface water monitoring rounds were undertaken this period. In addition a smaller follow up round was undertaken, post the finding of an elevated DCBOD (3.3 g O₂/m³) during the October 2020 monitoring round.

The follow up round did not record any elevated DCBOD.

What is apparent in six of seven surface water monitoring rounds is the elevated concentrations of total ammoniacal nitrogen. The concentrations, particularly at site HHG000103, regularly fail to achieve the NPS-FM national bottom line (five of seven monitoring rounds), for the total ammoniacal nitrogen annual maximum attribute. Through the implementation of the NPS-FM, the Council will be need to ensure that water quality is, at a minimum, achieving national bottom lines where these concentrations are the result of human activities.

Part g) of condition 25, on consent 5838-2.2, states that the discharge shall not have any significant adverse effect on aquatic life. An exceedance of the national bottom line, as defined by NPS-FM, equates to 20% of the most sensitive species within a water course are impacted regularly. It is noted that the Council's biological monitoring of the Haehanga Stream (Section 2.1.8) concluded with:

'MCI declines significantly downstream of consented activities such as the wetland treatment system discharge as well as the irrigation areas.'

This demonstrates that the facility was in breach of consent 5838-2.2, through the discharge resulting in significant cumulative adverse effects to instream biota (whether due to the ammonia concentrations or other factors).

Part i) of condition 11, consent 5838-2.2 states; 30 metres below the irrigation areas there should be no significant adverse effect on aquatic life. HHG000168 is the compliance point, 30 m downstream from the irrigation areas. Exceedance of the NPS-FM ammoniacal nitrogen bottom line (annual maximum, pH-adjusted) occurred on two of seven occasions (14/08/2020 and 02/07/2021). In addition, another breach was recorded through incident monitoring (26/06/2021), discussed in the next section. Noting the biologist's conclusion, the Company were in breach of consent condition 11, on three occasions this monitoring period (14/08/2020, 26/06/2021 and 02/07/2021).

To a lesser degree, similar exceedances of the NPS-FM ammonium attribute were also recorded at sites HHG106, 115, 160 and 190. These sites do not have specific conditions stipulating the analytical requirements per site.

It is noted that the timing of the compliance sampling rounds do not target worst case scenario for un-ionised ammonia. Due to the breadth of the sampling round and the requirement to have bacteriological samples dispatched the same day of collection, this negates taking samples later in the afternoon.

In future, a more targeted approach will be adopted to assess elevated pH in the afternoon, during the summer low flows observed at the site. This will help determine whether there is a greater impact on instream communities as a process of the elevated pH in the presence of ammonia than currently presented.

E. coli monitoring was added to the surface water program in January 2021. This was to quantify bacteriological impacts to the Haehanga Stream. Three surface water monitoring rounds were undertaken. Significant increases were recorded down the length of the Haehanga Stream. The lowest monitoring site, HHG000190, recorded two of three results which were in exceedance of MfE/MoH and NPS-FM national bottom line (>540 *E. coli*/100 ml) for contact recreation.

The impact of the Company operations, from a bacteriological perspective, is well demonstrated, when the top site, HHG000090 is compared to the bottom site, HHG000190. The concentrations recorded were generally an order of magnitude greater at the downstream site. On two occasions (February 2021 and July 2021), at a couple of mid-stream sites (HHG000099, February 2021 and HHG000099, July 2021), the variance of *E. coli* concentrations were two orders of magnitude greater than the upper catchment site, HHG000090.

2.1.3.2 Additional surface water incidents

The Council attended an after-hours call to a foaming incident on the lower Haehanga Stream. Accordingly five surface water samples were collected (Table 12).

Table 12 Afterhours incident foaming Haehanga Stream 25 June 2020

	25/06/2021	HHG000098	HHG000106	Haehanga prior to Mimi	U/S Mimi	D/S Mimi
Afterhours incident						
Parameter	Unit/date	16:05	16:35	17:05	17:20	17:35
Free Ammonia	g/m ³	0.00014	<u>0.111</u>	0.0083	0.00015	0.00086
Turbidity	NTU	6.5	22	12.2	4.4	5.3
pH	pH Units	7.2	7.6	7.2	7.3	7.3
pH field	pH Units	7.09	7.44	7.32	7.59	7.34
Electrical Conductivity (EC)	mS/m	15.3	48.3	29.5	11	12.4
Sample Temperature	°C	10.6	10.6	10.6	9.7	9.7
Total Ammoniacal-N	g/m ³	0.041	12.2	2.4	0.037	0.21
Total Ammoniacal-N pH 8 equivalent toxicity with field pH	g/m ³	0.02	<u>6.29</u>	<u>1.15</u>	0.02	0.10
Dissolved Reactive Phosphorus	g/m ³	0.01	0.35	0.136	0.008	0.018
Dissolved C-Biochemical Oxygen Demand (CBOD ⁵)	g O ₂ /m ³	< 2	< 2	< 2	< 2	< 2
Total Biochemical Oxygen Demand (TBOD ⁵)	g O ₂ /m ³	< 2	8	< 2	< 2	< 2
Escherichia coli	cfu / 100 ml	80	400	80	140	220
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Propiconazole	g/m ³	< 0.0003	<u>0.0003</u>	< 0.0003	< 0.0003	< 0.0003
Organochlorine Pesticides Screening in Water, By Liq/Liq						
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7

The analysis indicated the following:

Free ammonia was significantly elevated above the consent limit (>0.025 g/m³) at one site (HHG000106).

In addition, the corresponding concentration of total ammoniacal nitrogen (6.25 g/m³) at HHG000106 (equivalent toxicity at pH 8 utilising field pH, as required by NPS-FM) was above the threshold for the worst attribute state D (>2.2 g/m³). It was also in exceedance of the 80% species protection guidelines value (>2.3 g/m³) from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018).

The sample site just prior to the Mimitangiatua River also held a reasonable concentration of pH 8 equivalent toxicity (field pH) for total ammoniacal nitrogen (1.15 g/m³). This is above the national bottom line as defined by the NPS-FM and in the range of deemed 80% species protection (>0.4-≤2.2 g/m³).

Dissolved reactive phosphorus (DRP) results were also elevated at HHG000106 (0.35 g/m³) and prior to the Mimitangiatua (0.136 g/m³). Both results significantly exceed attribute state D⁸ (>0.054 g/m³), as defined by the NPS-FM. Though it is further noted, that to compare the DRP results with the policy statement, the median of monthly samples over a five year period must be calculated. In the absence of monthly samples,

⁸Ecological communities impacted by substantial DRP elevation above natural reference conditions. In combination with other conditions favoring eutrophication, DRP enrichment drives excessive primary production and significant changes in macroinvertebrate and fish communities, as taxa sensitive to hypoxia are lost. (NPS-FM 2020 DRP attribute state D).

this serves as reminder that DRP concentrations within surface water should not be elevated above natural reference conditions.

The azole based fungicide (propiconazole) was also detected at a trace concentration (0.0003 g/m^3). This suggests the origin of these elevated concentration is the irrigation pond (IND002044). This concentration was in exceedance of the NZEPA environmental exposure limit (0.0001 mg/L)⁹. Though below the proposed 99% species protection guideline value for freshwater (0.0037 g/m^3)¹⁰.

Note, there were no petroleum hydrocarbons recorded above the LOD in all samples.

An additional inspection was undertaken the following day, and this included a number of surface water samples. The investigating officer identified that an irrigation pod had been operated for an extended period of time. This had resulted in significant ponding and in overland flow directly to the Haehanga Stream (Table 13).

Table 13 Follow up surface water samples 26 June 2021

After hours incident	26/06/2021	HHG000099	u/s of overland flow discharge	discharge from land	d/s from discharge	HHG000165	HHG000168	just before confluence on Haehanga prior to	U/S Mimi	D/S Mimi
Parameter	Unit/time	10:15 am	8:59 am	8:47 am	8:37 am	8:21 am	9:40 AM	7:29 am	8:01 am	7:08 AM
Free Ammonia	g/m^3	0.00038	0.0159	12.7	0.0191	0.00048	<u>0.055</u>	<u>0.167</u>	0.00018	0.0051
Turbidity	NTU	44	12.9	250	11.1	9.8	11.8	15.6	5.6	5.5
pH	pH Units	7.1	7.1	8.1	7.2	7.2	7.5	7.8	7.2	7.3
pH field	pH units	7.28	7.72	8.29	7.15	6.6	7.17	7.33	7.16	7.17
Electrical Conductivity (EC)	mS/m	21.2	33.7	557	34.3	22.4	37.8	46	11.1	14.6
Sample Temperature	°C	11.3	11.6	12.6	11.8	12.6	11.8	11.5	10.7	10.7
Total Ammoniacal-N	g/m^3	0.113	4.6	360	4.9	0.121	6.6	11.6	0.043	1.07
Total Ammoniacal-N equivalent toxicity at pH 8 with field pH	g/m^3	0.054	<u>3.12</u>	580	<u>2.21</u>	0.045	<u>2.98</u>	<u>5.55</u>	0.019	<u>0.48</u>
Dissolved Reactive Phosphorus	g/m^3	0.131	0.102	3.7	0.107	0.013	0.109	0.119	0.008	0.018
Dissolved C-Biochemical Oxygen Demand (CBOD ⁵)	$\text{g O}_2/\text{m}^3$	< 2	< 2	90	< 2	< 2	< 2	< 2	< 2	< 2
Total Biochemical Oxygen Demand (TBOD ⁵)	$\text{g O}_2/\text{m}^3$	< 2	2	164	3	< 2	3	4	< 2	< 2
Escherichia coli	cfu / 100 ml	270	180	4,000	150	450	160	50	300	270
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq										
Propiconazole	g/m^3	< 0.0003	< 0.0003	<u>0.0103</u>	< 0.0003	< 0.0003	< 0.0003	<u>0.0003</u>	< 0.0003	< 0.0003
Tebuconazole	g/m^3	< 0.0004	< 0.0004	<u>0.015</u>	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Total Petroleum Hydrocarbons in Water										

⁹ Environmental exposure limit means the limit on the concentration of a substance (or any element or compound making up the substance) with ecotoxic properties in an environmental medium as set in accordance with this section or EPA notices. Section 77B Part 6 Exposure limits for substances with toxic or ecotoxic properties. Hazardous Substances and New Organisms Act 1996.

¹⁰ Table 46 Proposed aquatic ecosystem protection guideline values for pesticides commonly used in the Great Barrier Reef catchment area Part 2. Department of Science, Information Technology and Innovation, Queensland Government 2017.

After hours incident	26/06/2021	HHG000099	u/s of overland flow discharge	discharge from land	d/s from discharge	HHG000165	HHG000168	just before confluence on Haehanga prior to	U/S Mimi	D/S Mimi
Parameter	Unit/time	10:15 am	8:59 am	8:47 am	8:37 am	8:21 am	9:40 AM	7:29 am	8:01 am	7:08 AM
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 2	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 4	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7

The follow up samples from the 26 June 2021 incident indicated the following:

The discharge contained significant concentrations of free ammonia (12.7 g/m³), total ammoniacal nitrogen (360 g/m³, with a equivalent toxicity to pH 8 utilising field pH of 580 g/m³), DRP (3.7 g/m³), oxygen demand (DCBOD 90 g O₂/m³), *E. coli* (4,000 cfu/100 ml), as well as measurable azole based fungicides (propiconazole 0.010 g/m³ and tebuconazole 0.015 g/m³).

The preceding water quality sample upstream, from the main overland flow discharge (8:59 am) held a concentration of total ammoniacal nitrogen that was in excess of the NPS-FM bottom attribute state D (>2.2 g/m³) and also in excess of the ANZG 2020 ammonia guideline for 80% species protection (>2.3 g/m³).

Both these guidelines were further exceeded at three out of five samples locations below the discharge. Notably, the corresponding concentration of free ammonia (0.055 g/m³) as well as total ammoniacal nitrogen (2.98 g/m³ equivalent toxicity at pH 8 with field pH) at site HHG000168 were in breach of consent 5838-2.2, condition 11. This monitoring location marks the compliance point, 30 metres downstream from the irrigation areas.

Just prior to the confluence with the Mimitangiatua River (07:29 am), the corresponding concentration of free ammonia (0.167 g/m³) and total ammoniacal nitrogen (5.5 g/m³ equivalent toxicity at pH 8 with field pH) were the most elevated in this data set. These concentrations are considered toxic to instream species. This sample also held measurable propiconazole (0.0003 g/m³) which was in excess of the NZEPA EEL, but below the 99% species protection, as defined by the Queensland Government.

This incident affected the Mimitangiatua River, by increasing the concentration of ammoniacal nitrogen above the national bottom line (NPS-FM) annual maximum (>0.4 g/m³). The Company were issued a letter requesting any explanation within fourteen days, and subsequently an abatement and infringement notice for this incident.

2.1.4 Sawdust analysis

The Council was alerted that the Company had been accepting and using treated sawdust in the form of light organic solvent preserved (LOSP) wood sawdust in its composting process. This is in contravention both to the applicable consent and to Company's management plan which specifically states no treated sawdust is accepted or utilised.

The Council collected three samples of sawdust, two from the large pile of stockpiled material held on Pad 1 and one sample from some recently deposited sawdust on Pad 3. Initially a leaching test (synthetic precipitation leaching procedure SPLP) was undertaken on the three samples (Table 14). This was followed by timber treatment chemical analysis by Scion (New Zealand Forest Research Institute). The Scion testing was specifically assessing for copper, chromium, and arsenic wood preservative.

Table 14 Leaching (SPLP) and wood treatment chemical analysis testing (sawdust)

SPLP (leaching test) sawdust RJ Hill	Sample	RNZ01 Pad 3	RNZ02 Pad 1	RNZ03 Pad 1
Organonitro & phosphorus Pesticides Screen in MR Water Liq/liq	Unit			
Permethrin	g/m ³	< 0.0010	<u>0.0012</u>	<u>0.0002</u>
Propiconazole	g/m ³	< 0.0003	<u>0.098</u>	<u>0.0023</u>
Tebuconazole	g/m ³	< 0.0004	<u>0.108</u>	<u>0.0036</u>
Copper, Chrome and Arsenic, Total, Trace				
Total Arsenic	g/m ³	< 0.0011	<u>0.161</u>	<u>0.024</u>
Total Chromium	g/m ³	< 0.00053	<u>0.023</u>	<u>0.00162</u>
Total Copper	g/m ³	< 0.00053	<u>0.03</u>	<u>0.0032</u>
Tributyl Tin Trace in Water samples by GCMS				
Dibutyltin (as Sn)	g/m ³	< 0.00006	< 0.00006	< 0.00006
Tributyltin (as Sn)	g/m ³	< 0.00005	< 0.00005	< 0.00005
Triphenyltin (as Sn)	g/m ³	< 0.00004	< 0.00004	< 0.00004
Scion wood treatment chemical check				
Copper	%m/m	<0.005	<u>0.033</u>	<0.005
Chromium	%m/m	<0.005	<u>0.064</u>	<0.005
Arsenic	%m/m	<0.005	<u>0.049</u>	<0.005
Boron	%m/m	<0.005	<0.005	<0.005

Table 12 demonstrates that the sawdust which was stockpiled on Pad 1 (RNZ 2 and 3), was treated sawdust. This included both LOSP treated and copper chromium and arsenic (CCA) treated. It has been confirmed in the case of the LOSP treated sawdust, that this was provided by Cleland's Timber.

It was communicated by the analyst of Scion, that in the case of the CCA analysis on RNZ03, the results were just below the LOD of the lab. This also lines up with the SPLP test undertaken on the same sample which held trace concentrations of the CCA.

Upon this identification the Company were abated to remove the material from site. They partially complied by bailing all the sawdust to prevent any ongoing discharge to the environment. It remains on site. Further analysis of LOSP treated material is discussed in Section 2.1.7 soil monitoring.

2.1.5 Irrigation pond monitoring

Leachate generated from both pad 1 (greenwaste pad) and pad 3 (drilling mud pad) flow through a series of sediment collection ponds prior to reaching the irrigation pond. From here, the leachate is irrigated across the irrigation areas (Figure 5) which totalled 13.18 ha during the year under review. The fluid leachate was sampled on six occasions this monitoring period. Ranges for each analyte are provided when analysed, since 2018.

Table 15 IND002044 irrigation pond monitoring 2020-2021

IND002044	Collected	Range 2018-2021	14/08/2020	14/10/2020	11/12/2020	25/02/2021	30/04/2021	2/07/2021
Parameter	Time		09:47	09:54	09:37	10:45	08:42	10:42
Sample Temperature	°C	8.4-23.6	11.1	16.9	19.6	21.4	13.6	9.2
Acid Soluble Barium	g/m ³	0.28-2.1	0.51	0.31	0.37	0.33	0.35	0.28
Acid Soluble Lead	g/m ³	0.002-0.061	0.005	0.006	0.008	0.006	0.006	0.008
Benzene	g/m ³	0.002-0.139	0.035	0.035	0.047	< 0.0010	0.0038	0.0022
Toluene	g/m ³	0.007-0.78	0.166	0.115	0.136	< 0.0010	0.0085	0.0072
Ethylbenzene	g/m ³	0.0009-0.0179	0.0155	0.0081	0.0131	< 0.0010	0.0012	0.0016
o-Xylene	g/m ³	0.0018-0.057	0.038	0.02	0.03	< 0.0010	0.0028	0.0024

IND002044	Collected	Range 2018-2021	14/08/2020	14/10/2020	11/12/2020	25/02/2021	30/04/2021	2/07/2021
Parameter	Time		09:47	09:54	09:37	10:45	08:42	10:42
m&p-Xylene	g/m ³	0.004-0.144	0.103	0.052	0.083	< 0.002	0.007	0.005
C7 - C9	g/m ³	0.07-1.17	0.23	< 0.15	0.19	< 0.10	< 0.4	< 0.10
C10 - C14	g/m ³	0.3-1.5	0.7	< 0.4	0.5	< 0.2	< 1.0	0.4
C15 - C36	g/m ³	0.5-22	2.3	1.5	1.6	1.8	2	1.7
Total hydrocarbons (C7 - C36)	g/m ³	1-23	3.3	1.9	2.3	1.9	< 4	2.1
Carbonaceous Biochemical Oxygen Demand (cBOD ⁵)	g O ₂ /m ³	103-1,340	540	800	530	103	710	770
Electrical Conductivity (EC)	µS/cm	4,620-18,360	7,030	5,400	5,490	5,670	8,020	6,020
	mS/m	462-1,836	703	540	549	567	802	602
Chloride	g/m ³	430-570	1,040	570	720	990	940	610
Dissolved Arsenic	g/m ³	0.026-0.25	0.163	0.125	0.188	0.22	0.25	0.2
Dissolved Barium	g/m ³	0.23-0.77	0.45	0.3	0.3	0.23	0.29	0.23
Dissolved Cadmium	g/m ³	< LOD	< 0.00053	< 0.00010	< 0.00053	< 0.0003	< 0.00011	< 0.0005
Dissolved Chromium	g/m ³	0.008-0.069	0.036	0.031	0.049	0.031	0.069	0.05
Dissolved Copper	g/m ³	0.004-0.0109	0.0064	0.0054	0.0101	0.004	0.0109	0.008
Dissolved Lead	g/m ³	0.0009-0.0032	0.0014	0.0012	0.0022	0.0011	0.001	0.0015
Dissolved Mercury	g/m ³	< LOD	< 0.00015	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Dissolved Nickel	g/m ³	0.03-0.136	0.049	0.03	0.033	0.048	0.045	0.036
Dissolved Zinc	g/m ³	0.005-0.024	0.012	0.016	0.018	< 0.005	0.014	0.024
Escherichia coli	cfu / 100 ml	1,100-16,000	-	-	-	1,100	2,000	16,000
Free Ammonia as N	g/m ³	1.84-26	8	6.3	8	26	12.3	6.7
Nitrate-N + Nitrite-N	g/m ³	0.006-0.24	0.06	< 0.10	< 0.10	0.24	0.02	0.09
Total Ammoniacal-N	g/m ³	165-590	490	420	340	240	580	420
Total Kjeldahl Nitrogen (TKN)	g/m ³	230-600	490	400	350	310	590	460
pH	pH Units	7.4-8.4	7.9	7.7	7.8	8.4	7.9	8
Sodium Absorption Ratio (Total)		3.1-11	4.2	3.4	3.5	3.9	4.3	3.1
Total Barium	g/m ³	0.42-5.6	0.88	0.43	0.63	0.87	0.51	0.52
Total Calcium	g/m ³	138-550	220	145	138	210	210	185
Total Magnesium	g/m ³	18.1-59	39	26	25	41	45	37
Total Nitrogen	g/m ³	230-600	490	400	350	310	590	460
Total Potassium	g/m ³	320-2,700	440	320	550	600	620	420
Total Sodium	g/m ³	170-950	260	170	172	240	270	177
Total Sulphide Trace	g/m ³	0.29-22	-	-	-	0.29	1.45	22
Turbidity	NTU	189-490	-	-	-	460	490	189
Un-ionised hydrogen sulphide	g/m ³	0.009-2.7	-	-	-	0.009	0.171	2.7
Methylene Blue Active Substances	g/m ³	1	-	-	-	-	-	1
Permethrin	g/m ³	LOD-0.0002	-	-	-	-	< 0.00015	0.00022
Propiconazole	g/m ³	0.014-0.019-	-	-	-	-	0.0199	0.0148

IND002044	Collected	Range 2018-2021	14/08/2020	14/10/2020	11/12/2020	25/02/2021	30/04/2021	2/07/2021
Parameter	Time		09:47	09:54	09:37	10:45	08:42	10:42
Tebuconazole	g/m ³	0.024-0.029	-	-	-	-	0.029	0.024
Dibutyltin (as Sn)	g/m ³	<LOD	-	-	-	-	-	< 0.00011
Tributyltin (as Sn)	g/m ³	<LOD	-	-	-	-	-	< 0.00009
Triphenyltin (as Sn)	g/m ³	<LOD	-	-	-	-	-	< 0.00007

In terms of consent compliance, the sodium absorption ratio (SAR) is required to be below 18 SAR, while the concentration of TPH within the fluid must be below 5% (50,000 g/m³). Both these condition were met.

In terms of analytes:

- Temperature ranged 9.2-21.6°C.
- Acid soluble barium ranged 0.28-0.51 g/m³.
- Acid soluble lead was detected at trace concentrations, 0.005-0.008 g/m³.
- Benzene ranged from below the LOD through to 0.047 g/m³.
- Toluene ranged from below the LOD through to 0.166 g/m³.
- Ethylbenzene ranged from below the LOD through to 0.0155 g/m³.
- o-Xylene ranged from below the LOD through to 0.038 g/m³.
- m & p Xylene ranged from below the LOD to 0.103 g/m³.
- Total petroleum hydrocarbons (C7-C36) ranged 1.9-3.3 g/m³.
- Carbonaceous biochemical oxygen demand ranged 103-800 g O₂/m³. It is noted that the 103 g O₂/m³ result (February 2021) is the lowest oxygen demand result since August 2017.
- Electrical conductivity (EC) ranged 540-802 mS/m @ 25°C.
- Chloride concentration ranged 570-1,040 g/m³. Of note is the gradual reduction in chloride concentration within the irrigation pond over time (Figure 6).

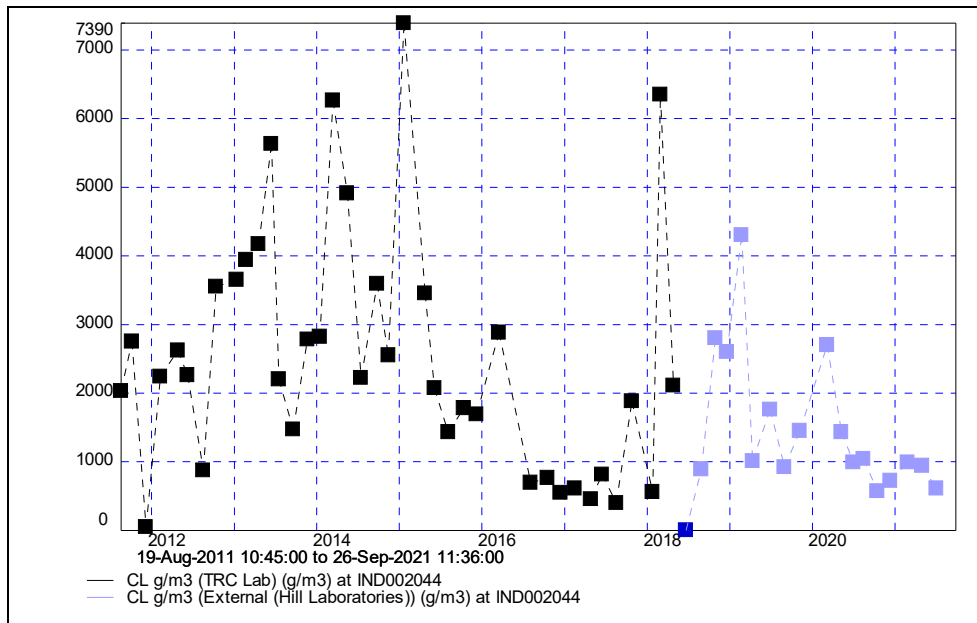


Figure 6 Long term chloride monitoring irrigation pond August 2011- September 2021

In terms of dissolved metals:

- Dissolved arsenic remained relatively stable throughout the monitoring period, ranging 0.12-0.25 g/m³.
- Dissolved cadmium was below the LOD across all samples.

- Dissolved chromium remained relatively stable, ranging 0.031-0.069 g/m³.
- Dissolved copper ranged 0.004-0.0101 g/m³. It is noted that 0.101 g/m³ is the most elevated result at this site, since 2018.
- Dissolved lead ranged 0.001-0.002 g/m³.
- Dissolved mercury was below the LOD in samples.
- Dissolved nickel ranged 0.03-0.049 g/m³.
- Dissolved zinc ranged from below the LOD to 0.024 g/m³.
- Three *E. coli* results ranged 1,100-16,000 cfu/100 ml.

In terms of nitrogen in the irrigation fluid:

- Un-ionised ammonia ranged 6.3-26 g/m³.
- Nitrate nitrite nitrogen ranged from below the LOD through to 0.24 g/m³.
- Total ammoniacal nitrogen ranged 240-580 g/m³.
- Total kjeldahl nitrogen (TKN) and total nitrogen (TN) ranged 310-590 g/m³.
- Total barium ranged 0.43-0.88 g/m³.
- Dissolved barium ranged 0.23-0.45 g/m³.
- Total calcium ranged 138-200 g/m³.
- Total magnesium ranged 25-45 g/m³.
- Total potassium ranged 320-620 g/m³.
- Total sodium ranged 170-270 g/m³.
- Turbidity ranged 189-490 g/m³.
- Total sulphide ranged 0.29-22 g/m³.
- Un-ionised hydrogen sulphide ranged 0.009-2.7 g/m³.
- Methylene blue activated substance (MBAS) recorded one result at 1 g/m³.

Organonitro and phosphorus pesticides which returned results above the LOD were as follows:

- Permethrin (insecticide) was recorded on one occasion above the LOD, 0.00022 g/m³.
- Propiconazole (fungicide) in two sample rounds, 0.011 and 0.014 g/m³.
- Tebuconazole (fungicide) in two sample rounds, 0.024 and 0.029 g/m³.

Older wood preservative testing:

- Dibutyltin, tributyltin and triphenyltin were below the LOD on one occasion.

2.1.5.1 Irrigation fluid application and estimated loading rates

The Company provided the Council with irrigation records for the monitoring period. The total volume of fluid irrigated to land (Figure 5) was calculated at 17,775 m³. The Company switched to low rate application irrigation pods in January 2021. This reduced the pump flow rate from 30 m³ per hour, to 20 m³ per hour.

Nitrogen put to land was estimated utilising the average concentration of total nitrogen (TN) from the irrigation pond, in this monitoring period. The average concentration was found to be 433 g/m³. The long term analysis of TN since 2018 is provided in Figure 7.

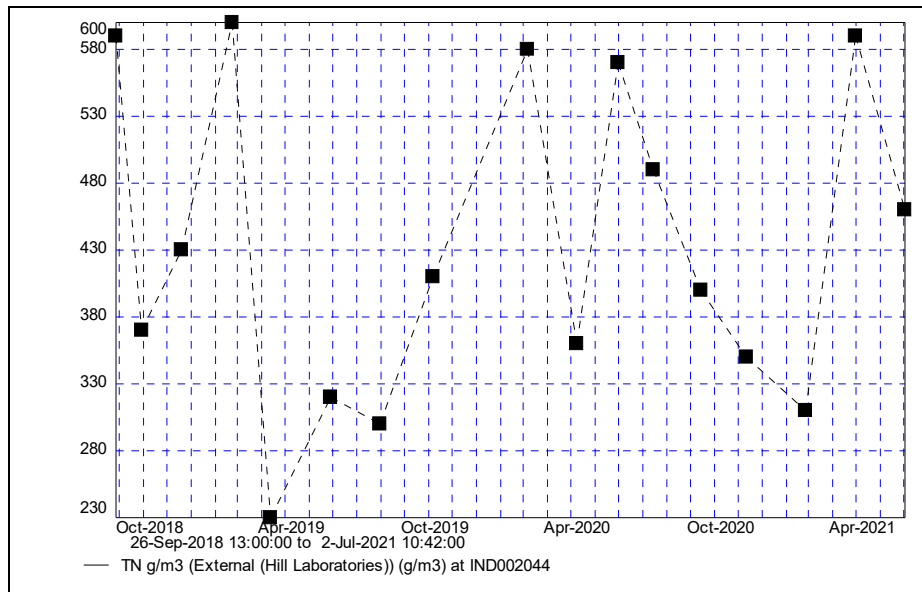


Figure 7 Total nitrogen monitoring IND002044 September 2018 - September 2021

It was estimated that in the 2020-2021 monitoring period 7,696 kg nitrogen was discharged to land via spray irrigation. This equates to a hypothetical loading rate of 584 kg N per ha across the Company's 13.18 ha irrigation areas. However, the irrigation areas were not evenly utilised this monitoring period (Figure 8).

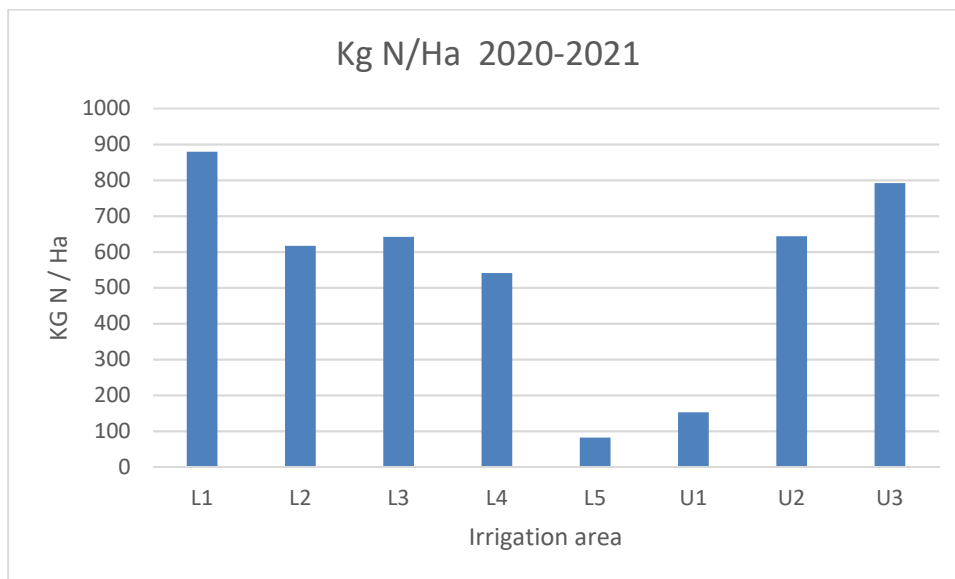


Figure 8 Estimated nitrogen loading rate KG N / Ha by irrigation area

Based on the estimated loadings (Figure 8), it can be determined that six of eight irrigation areas received in excess of 500 kg N/ha Pa. Of the six, five areas (L1, L2, L3, U2, and U3) received over 600 kg N/ha Pa. Of the five, two areas (L1 and U3) received over 700 kg N/ha Pa. One area (L1) received over 800 kg N/ha Pa.

Reductions in the quantity of nitrogen discharged occurred in areas L1, L2, U1, U2 and U3 (Figure 9) when compared to the 19-20 loading. However, while there were reductions in these five irrigation areas, the volumes discharged (bar U1) were over 600 kg N/ha, which is excessive. While in the case of area L1, the loading of nitrogen, which was lower than the 2019-2020 monitoring period, was estimated to be well over 800 kg N/ha.

Other industries have set nitrogen caps, which limit the total amount of nitrogen which can be put to land in a monitoring year. In some cases these caps are set between 250-400 kg N/ha, with the higher end of the

loading allowed for cut and carry operations. This is a means of removing excess nitrogen from the system. The strict loading rates are undertaken to prevent elevated nitrogen from affecting the groundwater and or surface water, which has been observed in some parts of the region. Noting the council is required to give effect to the National Policy Statement for Freshwater Management, balancing the applications to land with what can be sustainable sequestered will be vital for the Company moving forward.

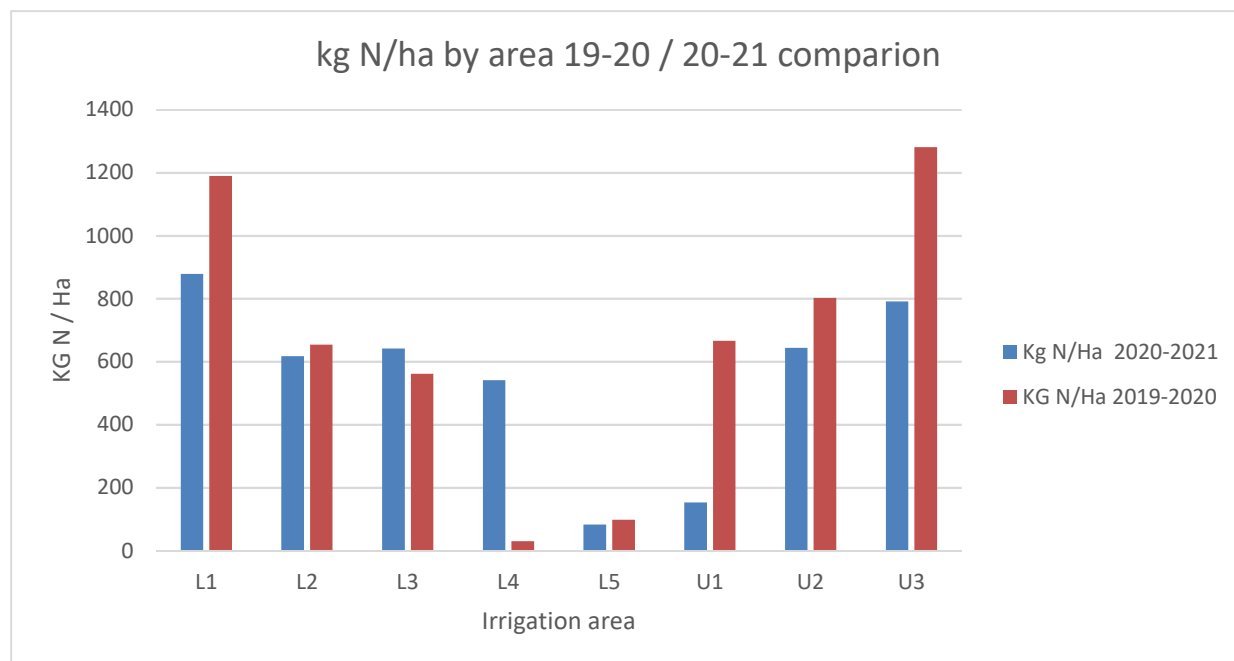


Figure 9 Nitrogen to land 2019-2020 compared to 2020-2021

2.1.6 Groundwater monitoring

Seven groundwater monitoring wells are present at the Uruti site (Figure 3). These were monitored on four occasions to assess for seasonal variation.

The results of the four monitoring rounds are provide in the following tables.

Table 16 GND2188 2020-2021 monitoring

GND2188	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	10:15	8:55	8:55	9:55
Level	M	0.49	1.01	1.81	1.32
Free Ammonia	g/m ³	0.0031	0.035	0.057	0.0072
pH	pH Units	6.5	6.7	6.8	6.5
Electrical Conductivity (EC)	mS/m	58.9	106.8	103.2	82.9
Electrical Conductivity (EC)	µS/cm	589	1,068	1,032	829
Total Dissolved Solids (TDS)	g/m ³	350	550	530	500
Sample Temperature	°C	13.7	16.5	16.8	16
Dissolved Barium	g/m ³	0.107	0.156	0.117	0.123
Acid Soluble Barium	g/m ³	< 0.11	0.18	0.15	0.12
Total Calcium	g/m ³	42	71	74	53
Total Magnesium	g/m ³	10.1	14.5	17.3	14.7
Total Sodium	g/m ³	26	50	55	40
Chloride	g/m ³	79	152	134	125

GND2188	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	10:15	8:55	8:55	9:55
Total Ammoniacal-N	g/m ³	2.9	19.6	22	6.3
Nitrate-N + Nitrite-N	g/m ³	8.8	9.1	0.25	14.7
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq					
Tebuconazole	g/m ³	NT	NT	NT	0.0007
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	0.25	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	0.16	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND2188 is located to south west of the site, within irrigation area U2. This was previously the old control bore, prior to the expansion of the irrigation areas southwards (upslope).

- Groundwater level ranged 0.49-1.81 m below ground level (bgl).
- pH results maintained a weakly acidic concentration, ranging 6.5-6.8 pH throughout the year.
- Electrical conductivity (EC) demonstrated an increase in the summer months. The increase was lower than in the previous monitoring period, ranging 58.9-106.8 mS/m @ 25°C (2020-2021) compared to 71.1-178 mS/m @ 25°C (2019-2020).
- Total dissolved solids followed a similar trend to the EC, with a peak observed in the summer months, ranging 350-550 g/m³.
- Dissolved barium remained measurable and fairly consistent across the monitoring period, ranging 0.107-0.156 g/m³.
- Acid soluble barium ranged from below the LOD (<0.11 g/m³) through to 0.18 g/m³.
- Chloride results ranged 79-152 g/m³, increased during the summer months. Long term monitoring of this analyte has indicated a slow and steady increase over time (since 2011, Figure 10).

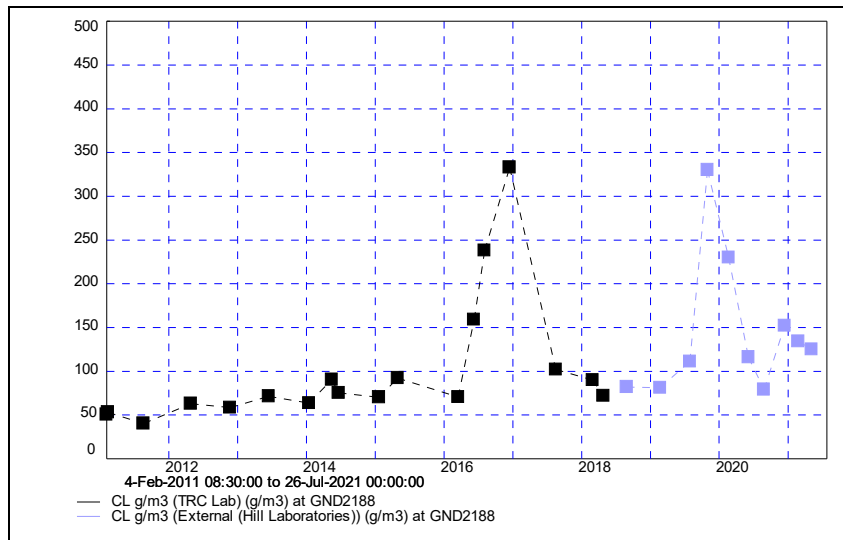


Figure 10 Long term chloride monitoring GND2188 2011-2021

Ammoniacal nitrogen ranged 2.9-22 g/m³. Note that 22 g/m³ NH₄ is the most elevated concentration in this data set to date. The data from the previous monitoring years indicates an increase in this analyte more recently than in the previous eight years (Figure 11).

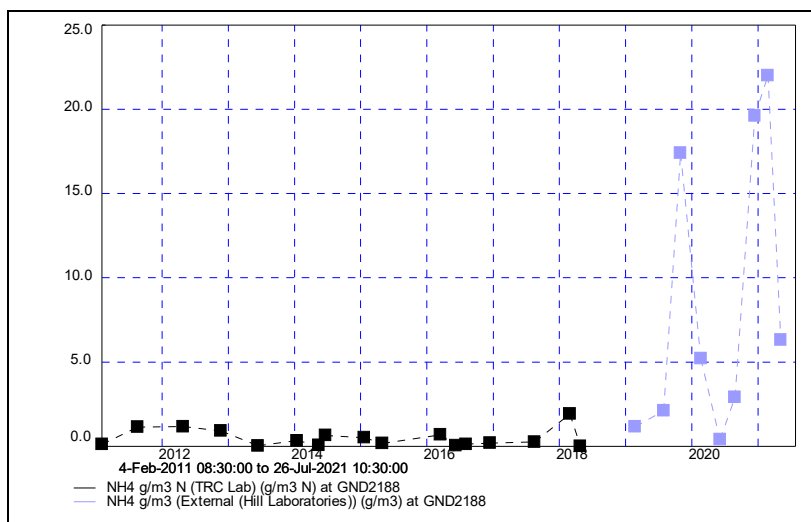


Figure 11 Long term ammoniacal nitrogen monitoring GND2188 2011-2021

- Nitrate nitrite nitrogen (NNN) monitoring indicated a degree of variation throughout the monitoring period, ranging 0.25-14.7 g/m³. The 14.7 g/m³ result was the second most elevated result recorded at this monitoring site since 2011. The peak was lower than in the previous monitoring period (18.8 g/m³) (Figure 12).
- Organonitro and phosphorus pesticide screening identified a trace concentration of the compound tebuconazole, (0.0007 g/m³, May 2021). The screening was undertaken on the final monitoring round. Pesticide monitoring will be added to the groundwater testing regime hereafter.
- Monitoring of benzene, toluene, ethylbenzene and xylenes, collectively known as BTEX, recorded a trace concentration of toluene in the December 2020 monitoring round.
- Similarly, total petroleum hydrocarbon (TPH) identified a trace concentration of C7-C9 during the same monitoring round (December 2020). No other detections were recorded above the LOD in subsequent monitoring rounds.

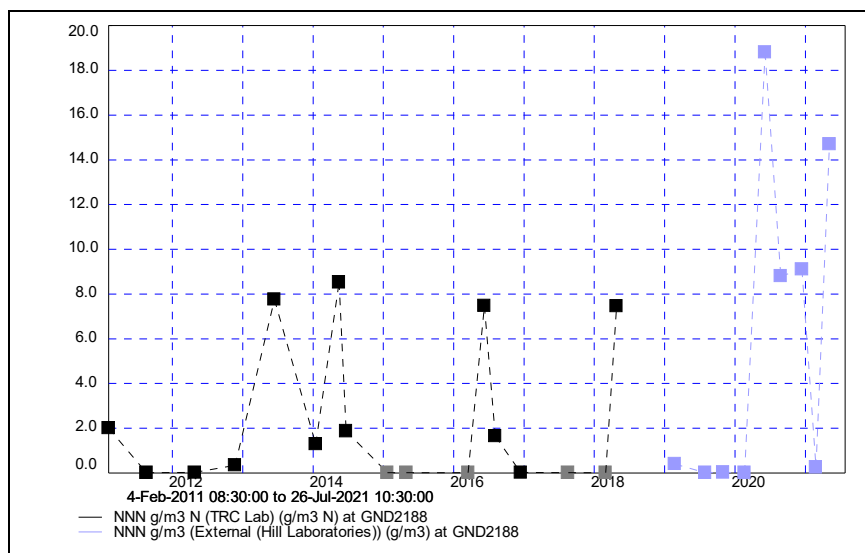


Figure 12 Long term NNN monitoring GND2188 2011-2021

Table 17 GND2189 2020-2021 monitoring

GND2189	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	11:00	9:35	9:35	10:35
Level	M	0.31	0.73	1.175	0.91
Free Ammonia	g/m ³	0.00045	0.00025	0.00024	0.000086
pH	pH Units	6.3	6.1	5.9	5.7
Electrical Conductivity (EC)	mS/m	29.7	80.5	98.1	92.8
Electrical Conductivity (EC)	µS/cm	297	805	981	928
Total Dissolved Solids (TDS)	g/m ³	240	450	550	600
Sample Temperature	°C	12.5	15.8	16.8	15.5
Dissolved Barium	g/m ³	0.149	0.31	0.42	0.41
Acid Soluble Barium	g/m ³	0.15	0.35	0.43	0.4
Total Calcium	g/m ³	17.6	46	57	54
Total Magnesium	g/m ³	5	14.3	17.8	18.3
Total Sodium	g/m ³	20	56	61	70
Chloride	g/m ³	45	210	240	240
Total Ammoniacal-N	g/m ³	0.87	0.6	0.78	0.52
Nitrate-N + Nitrite-N	g/m ³	0.005	< 0.002	< 0.002	< 0.002
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4

GND2189	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	11:00	9:35	9:35	10:35
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND2189 (Table 17) is located on the northern end of irrigation area U1.

Groundwater level ranged 0.31-1.175 m bgl.

- pH fluctuated by 0.6 units this monitoring period, and remained weakly acidic, tending slightly more acidic throughout the monitoring period.
- EC demonstrated an increase throughout the monitoring period.
- TDS also demonstrated an increase this monitoring period, doubling in concentration by the final round, when compared to the first round.
- Both dissolved and acid soluble barium demonstrated an increase in concentration throughout the monitoring period.
- Chloride also increased during the monitoring period rising from 45- 240 g/m³, (Figure 13). However, chloride concentrations remained below the elevation observed during the 2014-2015 monitoring period.
- Total ammoniacal nitrogen remained below <1 g/m³ across all four monitoring rounds.
- Nitrate nitrite nitrogen (NNN) was recorded on one occasion above the LOD, with the remainder below the LOD.
- BTEX and TPH were below the LOD across all four monitoring rounds.

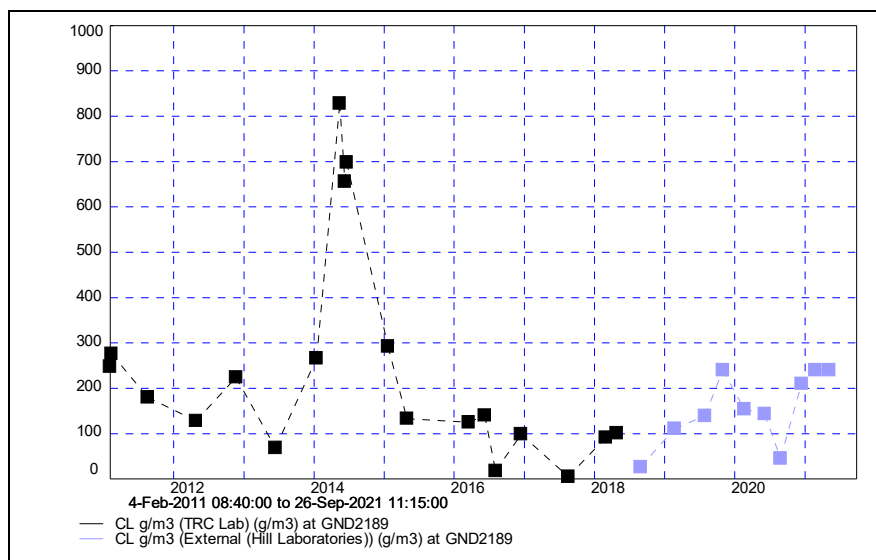


Figure 13 Long-term chloride monitoring GND2189 2011-2021

Table 18 GND2190 2020-2021 monitoring

GND2190	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	12:30	11:00	10:55	11:55
Level	M	0.38	0.76	1.41	1.06
Free Ammonia	g/m ³	0.000027	0.000092	0.000054	0.00007
pH	pH Units	5.4	5.6	5.4	5.5
Electrical Conductivity (EC)	mS/m	314	305	310	290
Electrical Conductivity (EC)	µS/cm	3,140	3,050	3,100	2,900
Total Dissolved Solids (TDS)	g/m ³	1,730	1,660	1,720	1,710

GND2190	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	12:30	11:00	10:55	11:55
Sample Temperature	°C	13	17	17.6	16.6
Dissolved Barium	g/m ³	1.85	1.65	1.74	1.58
Acid Soluble Barium	g/m ³	1.91	1.89	1.77	1.61
Total Calcium	g/m ³	151	146	147	139
Total Magnesium	g/m ³	21	19.9	19.8	21
Total Sodium	g/m ³	250	260	240	260
Chloride	g/m ³	900	890	940	870
Total Ammoniacal-N	g/m ³	0.4	0.54	0.58	0.58
Nitrate-N + Nitrite-N	g/m ³	0.34	0.044	0.04	0.26
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND2190 (Table 18) is located in irrigation area L2.

- The groundwater level ranged 0.38-1.41 m below ground level (BGL).
- Groundwater pH remained relatively stable this monitoring period. All results were in the acidic range (<7.0 pH).
- EC results remained elevated and stable (ranging 290-326 mS/m since July 2019) throughout the monitoring period.
- TDS remained stable throughout the monitoring period.
- Dissolved and acid soluble barium remained stable throughout the monitoring period.
- Sodium remained elevated and stable throughout the monitoring period, though it is noted that this analyte has remained at a concentration of 250 g/m³ +/- since August 2019.
- Chloride remained elevated within this monitoring well, fluctuating either side of 900 g/m³ (Figure 14). It is noted that the consent holder's tiered management plan dictates that concentrations over this limit (900 g/m³) should trigger a reduction in irrigation to this area.
- Dissolved inorganic nitrogen (DIN, NNN+NH₄) remained <1 g/m³ across all monitor rounds.
- BTEX and TPH were not recorded above the LOD.

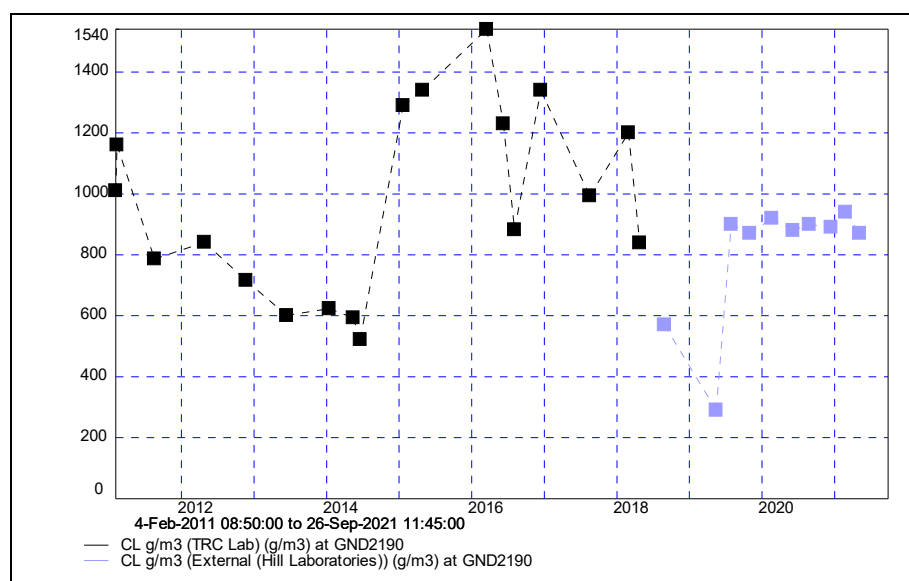


Figure 14 Chloride monitoring GND2190 February 2011 - September 2021

Table 19 GND3007 2020-2021 monitoring

GND3007	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	13:50	12:20	12:20	13:15
Level	M	1.45	1.965	3.2	2.31
Free Ammonia	g/m ³	< 0.000013	0.00007	0.00127	0.00031
pH	pH Units	6.6	6.7	6.3	6.3
Electrical Conductivity (EC)	mS/m	18	23.2	27.5	23.4
Electrical Conductivity (EC)	µS/cm	180	232	275	234
Total Dissolved Solids (TDS)	g/m ³	111	139	230	148
Sample Temperature	°C	13.3	16.4	17.4	15.5
Dissolved Barium	g/m ³	0.037	0.086	0.028	0.036
Acid Soluble Barium	g/m ³	< 0.11	< 0.11	< 0.11	< 0.11
Total Calcium	g/m ³	15	16.9	16.6	10.6
Total Magnesium	g/m ³	3.1	3.1	6	3.4
Total Sodium	g/m ³	13.6	10.5	12.2	11.2
Chloride	g/m ³	13.1	8.5	17.6	14.4
Total Ammoniacal-N	g/m ³	< 0.010	0.036	1.56	0.46
Nitrate-N + Nitrite-N	g/m ³	0.098	0.003	0.016	0.007
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2

GND3007	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	13:50	12:20	12:20	13:15
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND3007 (Table 19) is located at the entrance of the site, in close proximity to the State Highway.

- Groundwater level ranged 1.45-3.2 m bgl this monitoring period.
- Un-ionised ammonia concentrations recorded the most elevated concentrations to date (24 Feb 2021) (since 2018) in this monitoring period.
- pH remained lightly acidic across the four monitoring events, ranging 0.4 units.
- EC results demonstrated an overall increasing trend through the monitoring period.
- TDS recorded a doubling in concentration between the first and third monitoring events.
- Dissolved barium recorded a doubling in concentration between the first two monitoring rounds, prior to reducing.
- Acid soluble barium remained below the LOD across all monitoring events.
- Both sodium and chloride remained stable and of low concentrations across all monitoring events.
- Ammoniacal nitrogen ranged from below the LOD, through to 1.56 g/m³. This is the second most elevated concentration since monitoring began at this location, April 2018. The most elevated was recorded during the initial sampling round in 2018.
- Nitrate nitrite nitrogen remained at low concentrations across the four monitoring events.
- BTEX and TPH remained below the LOD across all four monitoring events.

Table 20 GND3008 2020-2021 monitoring

GND3008	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	13:15	11:45	11:40	12:35
Level	M	1.8	2.58	3.47	2.9
Free Ammonia	g/m ³	0.00054	0.0023	0.00183	0.00113
pH	pH Units	6.2	6.7	6.2	6.1
Electrical Conductivity (EC)	mS/m	193.8	111.8	82.8	122.4
Electrical Conductivity (EC)	µS/cm	1,938	1,118	828	1,224
Total Dissolved Solids (TDS)	g/m ³	1,190	630	490	800
Sample Temperature	°C	14.3	16.4	17.2	16.4
Dissolved Barium	g/m ³	0.94	0.3	0.158	0.33
Acid Soluble Barium	g/m ³	0.96	0.33	0.17	0.37
Total Calcium	g/m ³	163	78	55	97
Total Magnesium	g/m ³	36	21	18	30
Total Sodium	g/m ³	96	53	47	69
Chloride	g/m ³	370	220	173	270
Total Ammoniacal-N	g/m ³	1.01	1.1	3.3	2.2
Nitrate-N + Nitrite-N	g/m ³	<u>53</u>	8.3	< 0.002	3.1
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002

GND3008	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	13:15	11:45	11:40	12:35
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND3008 (Table 20) is located on the northern end of irrigation area L1.

- Groundwater level ranged 1.8-3.47m bgl.
- pH remained weakly acidic, ranging pH 6.1-6.7.
- EC results fluctuated across the four monitoring events. Over the long term record the conductivity continues to increase (Figure 11).
- TDS demonstrated a decreasing concentration through the summer months, prior to increasing in the May 2021 sample round. The long term record indicates that this analyte is increasing over time (Figure 15).
- Dissolved barium and acid soluble barium recorded the most elevated concentrations (0.91 g/m³ dissolved and 0.96 g/m³ acid soluble, both in August 2020) in this monitoring well since its inception (March 2019). The subsequent monitoring rounds recorded a reduction for both analytes.
- Chloride analysis indicated an overall reduction in concentration throughout the monitoring period. However the long term record (since September 2018) suggests a gradual increase in concentrations over time (Figure 16).
- Ammoniacal nitrogen fluctuated above 1 g/m³ this monitoring period, ranging 1.01-3.3 g/m³.
- Nitrate/ nitrite nitrogen recorded a significant increase (53 g/m³) in this analyte during the initial sampling round of the year (August 2021), prior to reducing in subsequent monitoring events (Figure 17).
- BTEX and TPH were not recorded above the LOD.

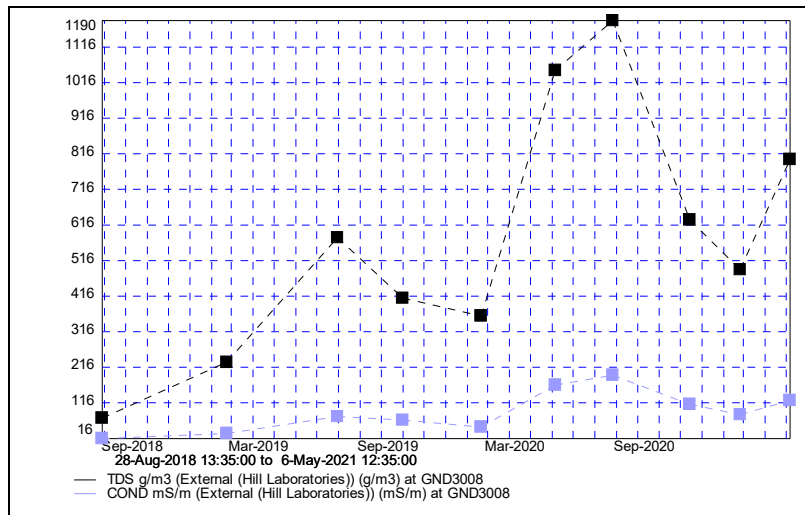


Figure 15 Electrical conductivity and TDS monitoring GND3009 August 2018 - May 2021

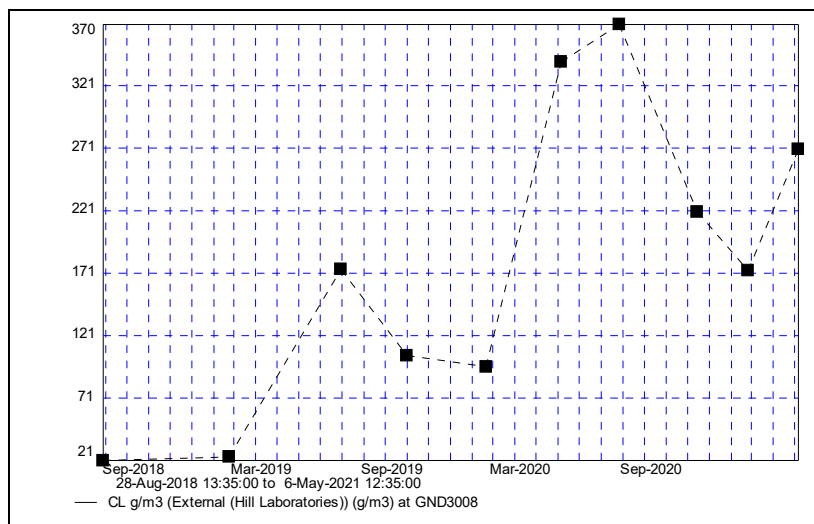


Figure 16 Chloride monitoring GND3008 September 2018- May 2021

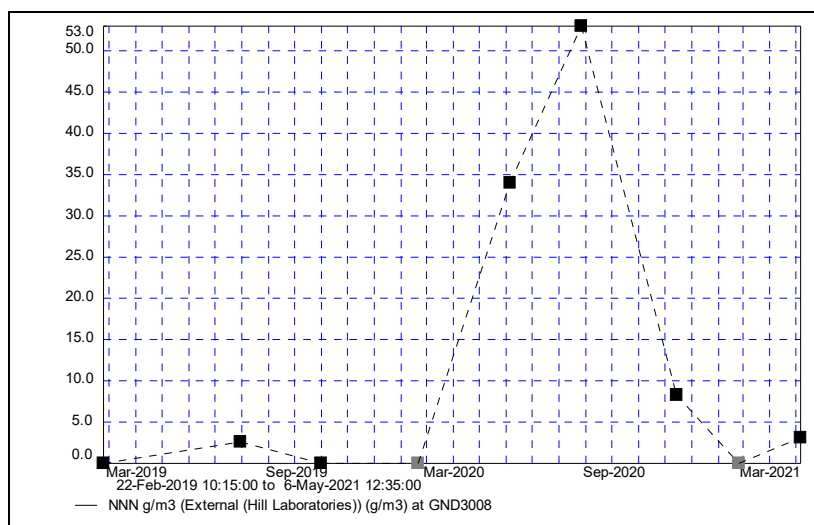


Figure 17 Nitrate nitrite (NNN) monitoring GND3008 May 2019- May 2021

Table 21 GND3009 2020-2021 monitoring

GND3009	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	11:45	10:20	10:15	11:15
Level	M	2.1	1.96	2.12	2.05
Free Ammonia	g/m ³	0.00132	0.0028	0.023	0.0039
pH	pH Units	6.8	7.2	6.5	6.6
Electrical Conductivity (EC)	mS/m	140	125.2	260	257
Electrical Conductivity (EC)	µS/cm	1,400	1,252	2,600	2,570
Total Dissolved Solids (TDS)	g/m ³	1,080	950	1,570	2,200
Sample Temperature	°C	14.6	16.6	17.1	16.2
Dissolved Barium	g/m ³	0.053	0.05	0.31	0.171
Acid Soluble Barium	g/m ³	< 0.11	< 0.11	0.5	0.18
Total Calcium	g/m ³	189	184	110	400
Total Magnesium	g/m ³	38	33	24	79
Total Sodium	g/m ³	43	32	240	103
Chloride	g/m ³	76	46	580	162
Total Ammoniacal-N	g/m ³	0.69	0.52	21	2.4
Nitrate-N + Nitrite-N	g/m ³	0.008	0.005	0.032	0.004
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND3009 (Table 21) is located to the north of the duck pond and to the east of irrigation area L3.

- Groundwater level remained relatively stable across the four monitoring events, ranging 1.96-2.12 m bgl.
- pH fluctuated close to neutral across the four monitoring rounds.
- EC monitoring recorded a doubling in concentration in the second half of the monitoring period. However when compared to the longer term record, this monitoring well is exhibiting an overall reduction in EC, (Figure 18).
- TDS monitoring followed a similar trend to the EC, by doubling in the second half of the monitoring period. However, in comparison to the EC, the long term record does not necessarily suggest an overall reduction in this analyte (Figure 19).
- Ammoniacal nitrogen demonstrated a good deal of variation across the four monitoring events, ranging 0.5-21 g/m³. The higher result (21 g/m³, February 2021) is in line with results from the previous monitoring period (Figure 20).

- Nitrate nitrite nitrogen remained at low concentration across the four monitoring events.
- BTEX and TPH were both below the LOD, across all four monitoring events.

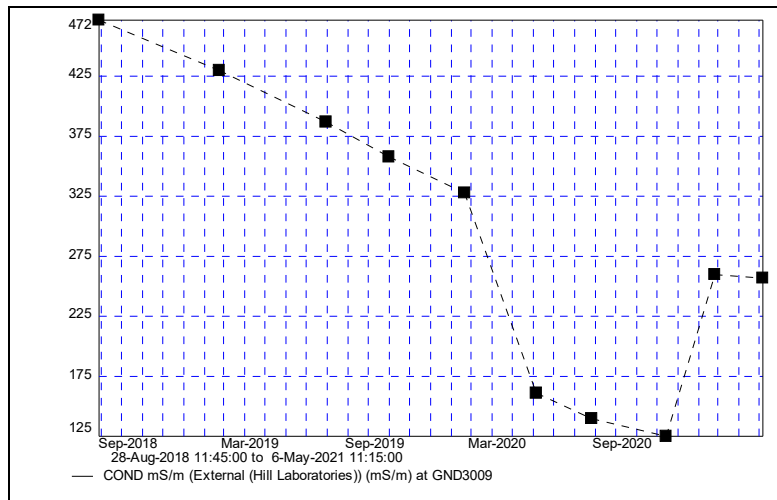


Figure 18 EC monitoring GND3009 September 2018 - May 2021

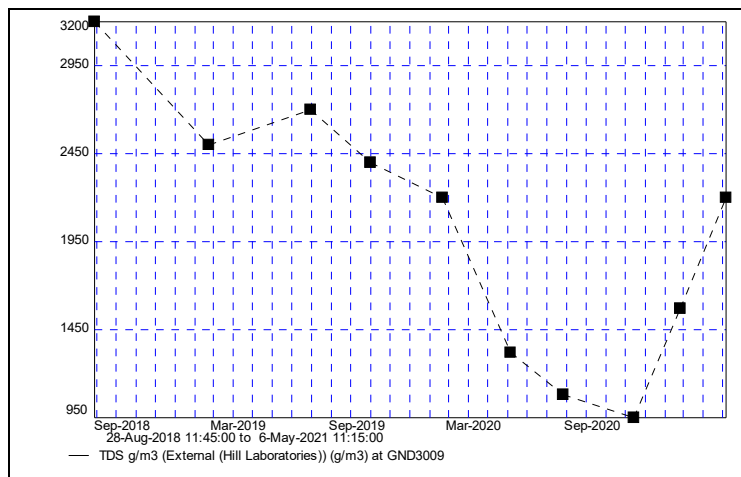


Figure 19 TDS monitoring GND3009 August 2018 - May 2021

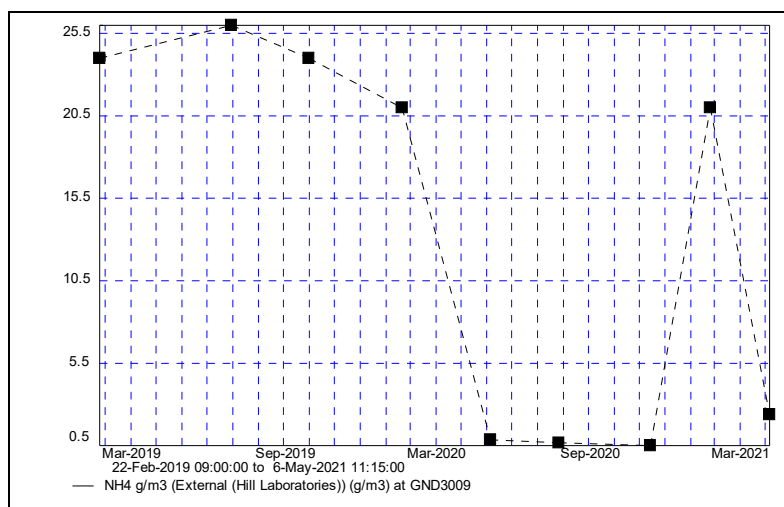


Figure 20 Ammoniacal nitrogen monitoring GND3009 February 2019 - May 2021

Table 22 GND3010 2020-2021 monitoring

GND3010	Date	26-Aug-20	14-Dec-20	24-Feb-21	6-May-21
Parameter	Time	9:25	8:10	8:15	9:20
Level	M	1.71	1.85	2.22	1.825
Free Ammonia	g/m ³	0.000064	0.00156	0.0034	0.00048
pH	pH Units	6	6.3	6.2	5.9
Electrical Conductivity (EC)	mS/m	34.5	48.7	37.5	34.8
Electrical Conductivity (EC)	µS/cm	345	487	375	348
Total Dissolved Solids (TDS)	g/m ³	230	290	260	210
Sample Temperature	°C	12.9	15.3	16.8	16
Dissolved Barium	g/m ³	0.077	0.054	0.01	0.046
Acid Soluble Barium	g/m ³	< 0.11	< 0.11	< 0.11	< 0.11
Total Calcium	g/m ³	33	33	22	24
Total Magnesium	g/m ³	6.4	10.5	9.6	11
Total Sodium	g/m ³	15.3	18.1	17.9	18
Chloride	g/m ³	26	11.4	14.2	22
Total Ammoniacal-N	g/m ³	0.25	2.1	6	1.59
Nitrate-N + Nitrite-N	g/m ³	6.2	0.005	0.007	0.003
BTEX in Water by Headspace GC-MS					
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	0.0053	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7

GND3010 (Table 22) is located south east of irrigation area U3.

- Groundwater level ranged 1.71-2.22 m bgl across the four monitoring events.
- pH remained relatively stable and weakly acidic, fluctuating around pH 6.
- EC results also remained relatively stable across the four monitoring events. A peak (48.7 mS/m) was observed in the December 2020 event. The peak is the most elevated result in this data since monitoring began, December 2018.
- Sodium results were relatively stable across the four monitoring events.
- Chloride results were higher in the winter months than in the summer. However, concentrations remained low when compared to other wells on site.
- Ammoniacal nitrogen results ranged from 0.25-6 g/m³.
- Nitrate nitrite nitrogen results ranged 0.003-6.2 g/m³.
- Toluene was detected during the August 2020 monitoring event, with a trace concentration of 0.0053 g/m³. Similar detections (GND2188, December 2020) have been recorded in other wells on site.

- No other petroleum related analytes were recorded above the LOD, this includes benzene, ethylbenzene, xylenes and TPH, all chains.

2.1.6.1 Groundwater discussion

No significant petroleum hydrocarbons were detected in any of the wells this monitoring period. Trace detections of TPH C7-C9 (GND2188) and toluene (GND2188 and 3010) were one time occurrences.

Chloride impacts remain apparent in GND2190. This suggests that additional mitigation in this irrigation area is required. The Company's facility management plan addresses how to mitigate the elevated chloride in this monitoring well. This will need to be adhered to.

The compound tebuconazole (which is a fungicide) was detected in one monitoring well (GND2188) at a trace concentration. The source of this was from the irrigation fluid, as the Company had been utilising light organic solvent preserved wood shavings in the composting process.

This material was not authorised to be on site. Continued monitoring for this compound and others will continue. Conversations are being held about the deployment of passive monitoring appliance for installation to the groundwater monitoring wells and the Haehanga Stream, to gain an understanding of the likely loading of these compounds over time.

Nitrogen impacts (in the form of NH_4 or NNN) to groundwater appear for the majority of the time, to be short term (<3 months). Though they have been observed to be short term, they are also significant in some cases (GN3008, August 2020, NNN 53 g/m³). GND3008 is located in irrigation area L1, this area received over 800 Kg N/ha this monitoring period. Chloride is also trending up in this monitoring well.

GND3007, which is located close to the state highway did detect some slight increases in TDS, EC, NH_4 and dissolved barium, though it is too early to state whether these are related to the site operations, further up the catchment.

2.1.7 Soil monitoring

Nine irrigation areas are now in operation at the Uruti site (Figure 5). Two composite samples were collected from each irrigation area this monitoring period. Of the two samples, one was collected via a soil corer extracted from 37 cm bgl. The second, a shallow sample, collected via a push corer to 7 cm bgl.

The aim of these were to assess for any variation between the shallow and deep core samples and specifically to assess from any azole based pesticides which were contained within the irrigation fluid. In addition, four spot samples were collected from the drilling mud pad, (pad 3). Included in the data set are the sample results from the previous three monitoring periods, where available, for comparison purposes.

Irrigation area U1

Table 23 Irrigation area U1 soil results 2018-2021

Soil results	Area	U1	U1	U1	U1 shallow
Parameter	Unit/Date	24/01/2018	26/06/2020	3/08/2021	3/08/2021
Dry Matter (Env)	g/100 g as rcvd	69	69	68	54
Soluble Salts	g/100 g dry wt	-	< 0.05	< 0.05	< 0.05
Conductivity from soluble salts	mS/cm	-	< 0.2	< 0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt	-	570	900	2,200
Total Recoverable Calcium	mg/kg dry wt	33.5	3,700	3,900	4,600

Soil results	Area	U1	U1	U1	U1 shallow
Parameter	Unit/Date	24/01/2018	26/06/2020	3/08/2021	3/08/2021
Total Recoverable Magnesium	mg/kg dry wt	4	6,000	6,400	5,700
Total Recoverable Potassium	mg/kg dry wt	23.7	1,300	1,340	1,580
Total Recoverable Sodium	mg/kg dry wt	46.8	199	165	177
Chloride	g/m ³	119.5	240	49	74
pH	pH Units	5.3	5.6	6	6
Total Recoverable Arsenic	mg/kg dry wt	5	4	5	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.12	0.1	0.13
Total Recoverable Chromium	mg/kg dry wt	22	21	21	18
Total Recoverable Copper	mg/kg dry wt	13	11	12	14
Total Recoverable Lead	mg/kg dry wt	15.4	13	14.6	12.4
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	16	14	15	13
Total Recoverable Zinc	mg/kg dry wt	66	61	68	77
Permethrin	mg/kg dry wt	-	-	< 0.003	< 0.004
Propiconazole	mg/kg dry wt	-	-	< 0.006	< 0.008
Tebuconazole	mg/kg dry wt	-	-	< 0.009	< 0.011
Benzo[e]pyrene	mg/kg dry wt	<u>0.015</u>	< 0.014	< 0.014	< 0.014
Perylene	mg/kg dry wt	<u>0.019</u>	< 0.014	< 0.015	< 0.018
Sodium Absorption Ratio (SAR)		2	2	1.6	1.2

Area U1 (0.51 ha) is located up gradient from the drilling mud pad, towards the south east side of the Uruti composting site. The monitoring over the past three years indicated the following:

- Soluble salts and the conductivity from the soluble salts were all below the laboratory limit of detection (LOD).
- Total barium demonstrated an increasing concentration between 2020 and 2021, noting the concentration of barium was more elevated in the shallow soil sample from 2021, (U1 shallow, 03/08/2021), as opposed to the deeper core (U1, 03/08/2021).
- Total recoverable calcium results demonstrated a relatively stable concentration between 2020 and 2021. Noting that the shallow sample (U1 shallow) held a more elevated concentration than the deeper core (U1, 03/08/2021).
- It should be noted in the case of the calcium, potassium and sodium concentrations for sample 24/01/2018, results are significantly lower than the succeeding samples. This was due to change in laboratory which occurred April 2018. The subsequent samples were analysed through a complete digestion, rather than measuring what was bioavailable.

- Chloride results demonstrated a decrease in concentration over time.
- Total heavy metal concentrations have remained stable across the four samples.
- Permethrin, propiconazole and tebuconazole were all below the LOD.
- No benzene, toluene, ethylbenzene, or xylenes were recorded above the LOD. These were not tabulated.
- In terms of polycyclic aromatic hydrocarbons, only compounds which were detected were tabulated. No recent detections of benzo[a]pyrene or perylene were recorded above the LOD this monitoring period.
- Sodium absorption ratio (SAR) remains at a low concentration.

Irrigation area U2

Table 24 Irrigation area U2 soil monitoring 2018-2021

Soil results	Area	U2	U2	U2	U2	U2	U2 shallow
Parameter	Unit/Date	21/06/2018	1/11/2018	12/04/2019	26/06/2020	3/08/2021	3/08/2021
Dry Matter (Env)	g/100 g as rcvd	49	53	64	71	69	53
Soluble Salts	g/100 g dry wt	-	< 0.05	0.07	0.09	0.05	0.07
Conductivity from soluble salts	mS/cm	-	< 0.2	0.2	0.2	< 0.2	0.2
Total Recoverable Barium	mg/kg dry wt	-	-	780	186	450	550
Total Recoverable Calcium	mg/kg dry wt	5,000	5,600	3,900	3,700	5,100	9,200
Total Recoverable Magnesium	mg/kg dry wt	4,900	4,800	4,300	5,700	6,500	6,200
Total Recoverable Potassium	mg/kg dry wt	1,620	1,950	1,360	1,280	1,720	1,780
Total Recoverable Sodium	mg/kg dry wt	145	160	165	143	210	260
Chloride	g/m ³	33	54	200	125	153	130
pH	pH Units	6.3	6.8	5.5	5.5	6.4	7
Total Recoverable Arsenic	mg/kg dry wt	-	5	4	5	5	6
Total Recoverable Cadmium	mg/kg dry wt	-	0.19	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	18	19	19	20	20
Total Recoverable Copper	mg/kg dry wt	-	14	12	11	14	20
Total Recoverable Lead	mg/kg dry wt	-	13.2	13.4	13.2	14.6	20
Total Recoverable Mercury	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	-	12	14	16	16	17
Total Recoverable Zinc	mg/kg dry wt	--	63	56	57	70	93

Soil results	Area	U2	U2	U2	U2	U2	U2 shallow
Parameter	Unit/Date	21/06/2018	1/11/2018	12/04/2019	26/06/2020	3/08/2021	3/08/2021
Permethrin	mg/kg dry wt	-	-	-	-	< 0.003	< 0.004
Propiconazole	mg/kg dry wt	-	-	-	-	< 0.006	< 0.008
Tebuconazole	mg/kg dry wt	-	-	-	-	< 0.009	< 0.011
TPH C15 - C36	g/m ³	55	< 50	< 40	< 40	< 40	67
Sodium Absorption Ratio (SAR)		0.8	1.2	1.5	1.6	1.9	1.1

Irrigation area U2 (2.53 ha) is also located in the upper reaches of the Uruti composting facility. Six soil samples have been collected at this location since June 2018 (Table 24).

- Soluble salts have ranged from below the LOD through 900 mg/kg. In terms of the shallow and deep 2021 soil samples, the shallower sample held a higher concentration than the deeper core.
- Conductivity from the soluble salts was at the LOD or marginally below it.
- Total recoverable barium results ranged 186-780 mg/kg.
- Calcium ranged 3,700-9,200 g/m³. The shallower soil sample (U2 shallow, 9,200 g/m³), held a more elevated result than the deeper core (U2, 03/08/2021, 5,200 g/m³).
- Magnesium results demonstrated a slight increasing concentration since 2018.
- Potassium remained relatively stable across the seven samples, with little difference between the shallow or deeper core.
- Soil sodium results demonstrated a slight increase in concentration since 2018.
- pH results remained weakly acidic (ranging 5.5-6.4 pH), while the shallower corer sample (U2 shallow), was recorded at pH 7.
- Total recoverable (TR) arsenic results have remained relatively stable across all monitoring rounds.
- TR cadmium results, apart from a trace detection (0.19 g/m³, 01/011/2018), early in the data set, were below the LOD.
- TR chromium, copper, lead and nickel remained stable across the soil samples.
- TR mercury was below the LOD in all samples.
- TR zinc demonstrated as slight increasing trend over time.
- Permethrin, propiconazole and tebuconazole were not detected above the LOD this monitoring period.
- In terms of PAH's, no compound has been detected above the LOD in any of the soil samples of this area, over time (since 2018). These results have not been tabulated.
- In terms of TPH, only carbon chain C15-C36 recorded trace concentrations in June 2018 and more recently, August 2021, U2 shallow.
- Sodium absorption ratios remained low across all soil samples.

Irrigation area U3

Table 25 Irrigation area U3 soil monitoring 2019-2021

Soil results	Area	U3	U3	U3	U3 shallow
Parameter	Unit/Date	12/04/2019	26/06/2020	03/08/2021	03/08/2021
Dry Matter (Env)	g/100 g as rcvd	77	74	78	62
Soluble Salts	g/100 g dry wt	< 0.05	0.17	0.08	0.08
Conductivity from soluble salts	mS/cm	< 0.2	0.5	0.2	0.2

Soil results	Area	U3	U3	U3	U3 shallow
Parameter	Unit/Date	12/04/2019	26/06/2020	03/08/2021	03/08/2021
Total Recoverable Barium	mg/kg dry wt	270	360	1,080	690
Total Recoverable Calcium	mg/kg dry wt	5,500	6,200	5,900	5,400
Total Recoverable Magnesium	mg/kg dry wt	6,300	6,800	7,000	6,300
Total Recoverable Potassium	mg/kg dry wt	1,410	1,660	1,520	1,580
Total Recoverable Sodium	mg/kg dry wt	156	230	240	188
Chloride	g/m ³	8	290	250	67
pH	pH Units	6.5	6.4	6.6	6.7
Total Recoverable Arsenic	mg/kg dry wt	5	5	5	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	20	21	21	19
Total Recoverable Copper	mg/kg dry wt	14	15	15	16
Total Recoverable Lead	mg/kg dry wt	16.2	16.4	16.8	22
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	20	19	19	18
Total Recoverable Zinc	mg/kg dry wt	67	68	72	74
Permethrin	mg/kg dry wt	-	-	< 0.003	< 0.003
Propiconazole	mg/kg dry wt	-	-	< 0.006	< 0.007
Tebuconazole	mg/kg dry wt	-	-	< 0.008	< 0.010
Perylene	mg/kg dry wt	< 0.013	0.084	< 0.013	0.029
TPH C15 - C36	g/m ³	< 40	42	< 40	47
Sodium Absorption Ratio (SAR)		0.7	1.7	1.3	1.2

Irrigation area U3 is the irrigation area furthest up catchment, spanning an area of 1.98 ha. Four soil samples have been collected from this area since 2019.

- Soluble salts ranged from below the LOD through to 1,700 mg/kg.
- Conductivity from the soluble salts ranged from below the LOD, through to 0.5 mS/cm.
- TR barium recorded an increase in concentration since 2019, ranging 270-1,080 mg/kg. The deeper core (U3, 03/08/2021) recording close to twice the shallow core concentration.
- Calcium, magnesium, potassium and sodium remained relatively stable across the four soil samples.

- Chloride results indicated an increase between the first and the subsequent monitoring rounds, noting the shallow sample held a lower concentration than the deeper core, in this monitoring period.
- Soil pH remained stable across all four samples, weakly acidic.
- TR arsenic, copper, lead, nickel and zinc remained stable across all four samples.
- TR cadmium and mercury were below the LOD in all four samples.
- Permethrin, tebuconazole and tebuconazole were all below the LOD.
- In terms of PAHs, only perylene has been recorded at low concentration, on two separate occasions. 26/06/2020 and 03/08/2021, U3 shallow). Remaining PAHs were all below their respective LOD's.
- In terms of TPH, only carbon chain C15-C36 was recorded, on the same two occasions: 26/06/2020 and 03/08/2021.
- Sodium absorption ration (SAR) remained low in all four samples.

Irrigation area L1

Table 26 Irrigation area L1 soil monitoring 2018-2021

Soil results	Area	L1	L1	L1	L1	L1	L1	L1 shallow
Parameter	Unit/Date	24/01/2018	21/06/2018	1/11/2018	12/04/2019	26/06/2020	5/08/2021	5/08/2021
Dry Matter (Env)	g/100 g as rcvd	70	61	63	61	71	71	53
Soluble Salts	g/100 g dry wt	-	-	0.15	0.1	800	< 0.05	0.09
Conductivity from soluble salts	mS/cm	-	-	0.4	0.3	0.2	< 0.2	0.3
Total Recoverable Barium	mg/kg dry wt	-	-	-	1660	1280	930	1,940
Total Recoverable Calcium	mg/kg dry wt	103.7	13,100	10,900	9,900	7,100	7,700	11,400
Total Recoverable Magnesium	mg/kg dry wt	13.5	4,500	5,500	3,800	5,500	5,900	5,100
Total Recoverable Potassium	mg/kg dry wt	40.4	1,470	1,470	1,990	1,500	1,590	1,880
Total Recoverable Sodium	mg/kg dry wt	59.2	270	340	300	320	290	310
Chloride	g/m ³	129	73	470	270	450	220	155
pH	pH Units	6.2	7.4	7	7	7.3	7	7.4
Total Recoverable Arsenic	mg/kg dry wt	4	-	6	5	5	5	7
Total Recoverable Cadmium	mg/kg dry wt	0.21	-	0.2	0.28	0.18	0.18	0.23
Total Recoverable Chromium	mg/kg dry wt	20	-	20	16	19	22	21
Total Recoverable Copper	mg/kg dry wt	14	-	24	19	21	16	26
Total Recoverable Lead	mg/kg dry wt	16.3	-	22	19.8	18.8	16.5	24
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	< 0.10	< 0.10	< 0.10	0.18	< 0.10

Soil results	Area	L1	L1	L1	L1	L1	L1	L1 shallow
Parameter	Unit/Date	24/01/2018	21/06/2018	1/11/2018	12/04/2019	26/06/2020	5/08/2021	5/08/2021
Total Recoverable Nickel	mg/kg dry wt	15	-	15	10	13	16	14
Total Recoverable Zinc	mg/kg dry wt	73	-	98	95	76	80	105
Permethrin	mg/kg dry wt	-	-	-	-	-	< 0.003	< 0.004
Propiconazole	mg/kg dry wt	-	-	-	-	-	< 0.006	< 0.008
Tebuconazole	mg/kg dry wt	-	-	-	-	-	< 0.009	< 0.011
C15 - C36	g/m ³	69	96	84	149	47	< 40	100
Total hydrocarbons (C7 - C36)	g/m ³	69	105	84	149	< 70	< 70	101
Sodium Absorption Ratio (SAR)		1.4	1.3	1.6	1.8	1.9	1.7	1.5

Irrigation area L1 (1.31 ha) is located at the northern end of the site, in close proximity to the main gate. It is one of the lower irrigation areas at the site as it is second furthest down catchment.

- Seven soil samples have been collected from this area since 2018 (Table 26).
- Soluble salts has been analysed in five of the seven samples, these ranged from below the LOD through to 0.15 g/100 g (1,500 mg/kg).
- TR barium results ranged 930-1,940 mg/kg, with the elevated result recorded in the shallow core (L1 shallow).
- TR calcium results, barring the initial round (24/01/2018), ranged 7,100-13,100 mg/kg. It should be noted that a change in laboratory between the initial round (Council laboratory) and the subsequent rounds (RJ Hill laboratory), resulted in a more rigorous digestion of the soil samples, as such the concentrations for cations are more elevated in the subsequent rounds than the initial.
- TR magnesium also, barring the initial round, ranged 3,800-5,900 mg/kg.
- TR potassium, bar the first round (24/01/2018) ranged relatively stable ranging 1,470-1,990 mg/kg.
- TR sodium also remained relatively stable, bar the initial round, ranging 270-340 mg/kg.
- Chloride concentrations ranged 73-470 mg/kg, and more recently have recorded a decrease in concentration over time.
- TR arsenic remained relatively stable, ranging 4-7 mg/kg across the six samples analysed.
- TR cadmium was measurable in all samples analysed, ranging 0.18-0.28 mg/kg.
- TR copper, lead, nickel and zinc remained relatively stable across all samples.
- TR mercury recorded a trace concentration (0.18 mg/kg, 05/08/2021), remaining samples were below the LOD.
- No permethrin, propiconazole, or tebuconazole was recorded above the LOD.
- Similarly no PAH's were recorded above the LOD across all samples collected.
- In terms of TPH, only carbon chain C15-C36 was detected, above the LOD in six of seven samples.
- Sodium absorption ration (SAR), remained of low concentration, ranging 1.3-1.9.

Irrigation area L2

Table 27 Irrigation area L2 soil monitoring 2018-2021

Soil results	Area	L2	L2	L2	L2	L2	L2 shallow
Parameter	Unit/Date	24/01/2018	1/11/2018	12/04/2019	26/06/2020	5/08/2021	5/08/2021
Dry Matter (Env)	g/100 g as rcvd	73	59	54	68	66	60
Soluble Salts	g/100 g dry wt	-	0.18	0.31	800	< 0.05	< 0.05
Conductivity from soluble salts	mS/cm	-	0.5	0.9	0.2	< 0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt	-	-	1380	490	410	650
Total Recoverable Calcium	mg/kg dry wt	279	13,800	17,200	8,500	7,300	6,900
Total Recoverable Magnesium	mg/kg dry wt	24.3	5,100	4,700	5,200	6,300	6,100
Total Recoverable Potassium	mg/kg dry wt	466.9	2,500	3,300	2,300	2,000	1,850
Total Recoverable Sodium	mg/kg dry wt	624.3	520	690	370	240	250
Chloride	g/m ³	1,254	580	1,060	440	68	53
pH	pH Units	7.2	7	7.2	7.2	7.2	7
Total Recoverable Arsenic	mg/kg dry wt	5	5	6	4	4	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.32	0.27	0.18	0.16	0.15
Total Recoverable Chromium	mg/kg dry wt	20	18	19	19	23	22
Total Recoverable Copper	mg/kg dry wt	21	32	24	13	14	16
Total Recoverable Lead	mg/kg dry wt	18.4	22	29	14.5	14.3	14.5
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	18	13	13	13	16	15
Total Recoverable Zinc	mg/kg dry wt	75	94	109	68	73	72
Permethrin	mg/kg dry wt	-	-	-	-	< 0.003	< 0.003
Propiconazole	mg/kg dry wt	-	-	-	-	< 0.007	< 0.007
Tebuconazole	mg/kg dry wt	-	-	-	-	< 0.009	< 0.010
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.017	0.019	< 0.015	<0.016	<0.017
Fluoranthene	mg/kg dry wt	< 0.014	< 0.017	0.02	< 0.015	<0.016	<0.017
Perylene	mg/kg dry wt	0.087	< 0.017	< 0.019	0.048	< 0.015	< 0.017
C10 - C14	g/m ³	< 20	< 20	< 30	22	< 20	< 20

Soil results	Area	L2	L2	L2	L2	L2	L2 shallow
Parameter	Unit/Date	24/01/2018	1/11/2018	12/04/2019	26/06/2020	5/08/2021	5/08/2021
C15 - C36	g/m ³	157	82	125	167	< 40	55
Total hydrocarbons (C7 - C36)	g/m ³	157	82	125	189	< 70	< 70
Sodium Absorption Ratio (SAR)		9.6	4.3	4.3	3.5	2.3	1.7

Irrigation L2 (1.61 ha) is one of the oldest irrigation areas on site. Six soil samples have been collected since 2018 (Table 22).

- Soluble salts have ranged from below the LOD through to 0.31 g/100 g (3,100 mg/kg). It was noted that the samples collected in this period were below the LOD on both occasions (shallow and deep cores). This suggests a reduction in salt concentrations when compared to the 2018 and 2019 sample rounds.
- TR barium ranged 410-1,380 mg/kg.
- TR calcium ranged (barring the initial round, see comment calcium area L1) 6,900-17,200 mg/kg. The concentration appears to be reducing over time.
- TR magnesium ranged relatively stable across the soil samples (bar the initial sample, see comment L1 cation digestion).
- TR potassium and sodium both demonstrated a slight reducing trend since 2018 and 2019 respectively.
- Chloride concentrations have reduced significantly in this area since 2018.
- Soil pH has remained stable, remaining neutral, 7- 7.2 pH.
- TR arsenic remained stable across all samples it was analysed.
- TR cadmium was measurable in all but one sample (24/01/2018). Ranging 0.15-0.32 g/m³.
- TR chromium, copper, nickel and zinc remained relatively stable across the monitoring round and are within back ground soil concentrations for these elements.
- TR mercury was below the LOD in all samples analysed.
- Permethrin, propiconazole and tebuconazole were below the LOD in both samples collected this monitoring period.
- In terms of PAHs, benzo (a) pyrene was recorded on one occasion (12/04/2019, 0.19 mg/kg).
- Fluoranthene was also recorded on one occasion (12/04/2019, 0.02 mg/kg).
- Perylene was recorded on two occasions (24/01/2018, 0.087 mg/kg and 26/06/2020, 0.048 mg/kg).
- In terms of TPH, carbons chain C10-14 were detected on one occasion (26/06/2020, 22 mg/kg) and C15-C36 on three occasions, ranging 82-189 mg/kg.
- Sodium absorption ratio (SAR) ranged 1.7-9.6. Noting the most recent results are the lowest results for this parameter, in this data set.

Irrigation area L3

Table 28 Irrigation area L3 soil monitoring 2018-2021

Soil results	Area	L3	L3	L3	L3 shallow
Parameter	Unit/Date	21/06/2018	26/06/2020	3/08/2021	3/08/2021
Dry Matter (Env)	g/100 g as rcvd	56	74	78	68
Soluble Salts	g/100 g dry wt	-	0.13	0.05	< 0.05
Conductivity from soluble salts	mS/cm	-	0.4	< 0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt	-	2,300	320	450

Soil results	Area	L3	L3	L3	L3 shallow
Parameter	Unit/Date	21/06/2018	26/06/2020	3/08/2021	3/08/2021
Total Recoverable Calcium	mg/kg dry wt	9,600	9,800	6,000	10,600
Total Recoverable Magnesium	mg/kg dry wt	4,700	6,000	7,100	6,900
Total Recoverable Potassium	mg/kg dry wt	2,200	1,800	1,480	1,480
Total Recoverable Sodium	mg/kg dry wt	570	400	230	230
Chloride	g/m ³	580	680	230	52
pH	pH Units	7.3	7.1	6.7	7.2
Total Recoverable Arsenic	mg/kg dry wt	-	5	5	5
Total Recoverable Cadmium	mg/kg dry wt	-	0.12	< 0.10	0.11
Total Recoverable Chromium	mg/kg dry wt	-	20	21	21
Total Recoverable Copper	mg/kg dry wt	-	18	14	17
Total Recoverable Lead	mg/kg dry wt	-	20	15.2	21
Total Recoverable Mercury	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	-	16	18	16
Total Recoverable Zinc	mg/kg dry wt	-	84	73	91
Permethrin	mg/kg dry wt	-	-	< 0.003	< 0.003
Propiconazole	mg/kg dry wt	-	-	< 0.006	< 0.007
Tebuconazole	mg/kg dry wt	-	-	< 0.008	< 0.009
Benzo[b]fluoranthene + Benzo[j]fluoranthene		<0.013	0.013	<0.013	<0.013
C7 - C9	g/m ³	< 11	< 8	< 8	< 9
C10 - C14	g/m ³	< 30	40	< 20	< 20
C15 - C36	g/m ³	49	260	< 40	60
Total hydrocarbons (C7 - C36)	g/m ³	< 80	300	< 70	< 70
Sodium Absorption Ratio (SAR)		4.6	2.1	2.1	1.2

Irrigation area L3 (1.47 ha) is also a long term irrigation area.

- Four samples have collected from this area since 2019 (Table 28).
- Soluble salts ranged from below the LOD through to 0.13 g/100g.
- Conductivity from field salts ranged from below the LOD on two occasion through to 0.4 mS/cm.
- TR barium ranged from 320-2,300 mg/kg.
- TR calcium ranged from 9,600-10,600 mg/kg.
- TR magnesium ranged 54,700-7,100 mg/kg.
- TR potassium ranged 1,480-2,200 mg/kg.

- TR sodium ranged 570-230 mg/kg.
- Chloride demonstrated a reduction across the samples, over time, ranging 52-680 mg/kg.
- pH results remained relatively stable, fluctuating either side of pH 7.
- TR arsenic, cadmium, copper, lead, nickel and zinc remained stable across the three sampling rounds analysed.
- TR mercury was below the LOD on the three occasions analysed.
- Permethrin, propiconazole and tebuconazole results were all below the LOD.
- In terms of PAHs, benzo[b]fluoranthene + benzo[j]fluoranthene was recorded on one occasion (26/06/2020) at a low concentration. The rest of the PAHs were below the LOD.
- TPH results recorded C10-C14 (40 mg/kg) on one occasion (26/06/2020) and C15-C36 (260 mg/kg) also on the same one occasion, 26/06/2020).
- Sodium absorption ratio ranged 1.2-4.6.

Irrigation area L4

Table 29 Irrigation area L4 soil monitoring 2019-2021

Soil results	Area	L4 Baseline	L4 Baseline	L4	L4 shallow
Parameter	Unit/Date	11/11/2019	11/11/2019	05/08/2021	05/08/2021
Dry Matter (Env)	g/100 g as rcvd	68	77	72	62
Soluble Salts	g/100 g dry wt	< 0.05	< 0.05	0.08	0.06
Conductivity from soluble salts	mS/cm	< 0.2	< 0.2	0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt	36	39	230	1,030
Total Recoverable Calcium	mg/kg dry wt	2,800	3,000	5,800	6,800
Total Recoverable Magnesium	mg/kg dry wt	5,100	5,100	7,200	5,400
Total Recoverable Potassium	mg/kg dry wt	880	910	1,460	1,640
Total Recoverable Sodium	mg/kg dry wt	80	90	192	210
Chloride	g/m ³	10	6	66	121
pH	pH Units	5.6	5.8	7.2	6.9
Total Recoverable Arsenic	mg/kg dry wt	4	3	4	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.14
Total Recoverable Chromium	mg/kg dry wt	18	16	23	19
Total Recoverable Copper	mg/kg dry wt	9	9	14	17
Total Recoverable Lead	mg/kg dry wt	10.8	10.4	15.1	19.3
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	14	14	19	15
Total Recoverable Zinc	mg/kg dry wt	54	54	71	81

Soil results	Area	L4 Baseline	L4 Baseline	L4	L4 shallow
Parameter	Unit/Date	11/11/2019	11/11/2019	05/08/2021	05/08/2021
Permethrin	mg/kg dry wt	-	-	< 0.003	< 0.003
Propiconazole	mg/kg dry wt	-	-	< 0.006	< 0.007
Tebuconazole	mg/kg dry wt	-	-	< 0.009	< 0.010
TPH C15 - C36	g/m ³	< 40	< 40	< 40	73
Sodium Absorption Ratio (SAR)		0.8	0.9	1	1.2

Irrigation area L4 (2.25 ha) is one of the newer irrigation area areas, constructed in the 2018-2019 monitoring period. Four soil samples have been collected from this area since November 2019 (Table 29).

The two soil samples collected in November 2019 stand as baseline soil samples. These were collected before the area was augmented to an irrigation area.

The analysis indicated the following:

- Soluble salts ranged from below the LOD in the baseline samples, through 0.08 g/100g (800 mg/kg) in the deeper core (05/08/2021, L4).
- Conductivity from soluble salts recorded one result above the LOD, (0.2 mS/cm, L4, 05/08/2021).
- TR barium results increased from the November 2019 monitoring round, with range a 36-39 mg/kg, through to 230-1,030 mg/kg. Of note, the shallower soil sample (1,030 mg/kg) contained a more elevated concentration than the deeper core (230 mg/kg) in the 2020-2021 monitoring period.
- TR calcium concentrations doubled in concentration between the November 2019 and the September 2021 monitoring rounds.
- TR magnesium concentrations remained relatively stable, though the deeper core (L4, 03/08/2021) held a more elevated concentration than the shallower core, which appeared within range of the November 2019 samples.
- TR potassium results increased between the monitoring rounds.
- TR sodium results doubled between the two monitoring rounds.
- Chloride concentrations increased from 6-10 mg/kg through 66-121 mg/kg.
- Soil pH results increased from a weakly acidic concentration (5.6-5.8 pH), to a more neutral concentration pH 6.9-7.2.
- TR arsenic remained relatively stable across the four soil samples.
- TR cadmium results recorded one concentration above the LOD, (L4 shallow, and 0.14 mg/kg).
- TR chromium, copper, lead, nickel and zinc recorded marginal increases between 2019 and 2021.
- TR mercury remained below the LOD across all samples.
- It should be noted that all heavy metals remained within background concentrations.
- Permethrin, propiconazole and tebuconazole was not recorded above the LOD.
- No PAHs were recorded above the LOD in all samples analysed, thus these results have not been tabulated.
- In terms of TPH, carbon chain C15-C36 recorded a low concentration of 73 mg/kg in the shallow sample (L4 shallow, 03/08/2021).
- Sodium absorption ratio remained low across all samples analysed.

Irrigation area L5

Table 30 Irrigation area L5 soil monitoring 2020-2021

Soil results	Area	L5	L5	L5 shallow
Parameter	Unit/Date	26/06/2020	3/08/2021	3/08/2021
Dry Matter (Env)	g/100 g as rcvd	68	67	57
Soluble Salts	g/100 g dry wt	< 0.05	< 0.05	< 0.05
Conductivity from soluble salts	mS/cm	< 0.2	< 0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt	67	71	72
Total Recoverable Calcium	mg/kg dry wt	4,400	4,000	3,400
Total Recoverable Magnesium	mg/kg dry wt	6,400	6,800	5,800
Total Recoverable Potassium	mg/kg dry wt	1320	1,320	1,340
Total Recoverable Sodium	mg/kg dry wt	137	140	116
Chloride	g/m ³	81	22	48
pH	pH Units	6.1	5.8	5.7
Total Recoverable Arsenic	mg/kg dry wt	5	5	4
Total Recoverable Cadmium	mg/kg dry wt	0.11	0.11	0.13
Total Recoverable Chromium	mg/kg dry wt	22	23	19
Total Recoverable Copper	mg/kg dry wt	11	12	11
Total Recoverable Lead	mg/kg dry wt	13.9	14.5	12
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	17	17	15
Total Recoverable Zinc	mg/kg dry wt	68	68	63
Permethrin	mg/kg dry wt	-	< 0.003	< 0.003
Propiconazole	mg/kg dry wt	-	< 0.007	< 0.008
Tebuconazole	mg/kg dry wt	-	< 0.009	< 0.011
Sodium Absorption Ratio (SAR)		0.9	1	0.8

Irrigation area L5 (1.42 ha) is located to the east of the duck pond, in the centre of the site. This is also one of the newer irrigation areas.

Three samples have been collected from this area since 2020 (Table 30).

In terms of the analytical results.

- No significant change was recorded between the two monitoring periods. This would also line up with the irrigation records which stipulated that area L5 received the lowest application of nitrogen to land (82 kg N /ha).
- Notably, no permethrin, propiconazole or tebuconazole was recorded above the LOD.
- No petroleum hydrocarbon impacts were recorded above the LOD for PAHs or TPH.

- The sodium absorption ratio remained low.

Irrigation area L6

Table 31 Irrigation area L6 soil monitoring 2021

Soil results	Area	L6	L6 shallow
Parameter	Unit/Date	5/08/2021	5/08/2021
Dry Matter (Env)	g/100 g as rcvd	75	50
Soluble Salts	g/100 g dry wt	< 0.05	< 0.05
Conductivity from soluble salts	mS/cm	< 0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt	390	2,500
Total Recoverable Calcium	mg/kg dry wt	6,700	19,300
Total Recoverable Magnesium	mg/kg dry wt	7,700	5,200
Total Recoverable Potassium	mg/kg dry wt	1,310	2,100
Total Recoverable Sodium	mg/kg dry wt	210	390
Chloride	g/m ³	14	46
pH	pH Units	7.6	7.8
Total Recoverable Arsenic	mg/kg dry wt	4	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.18
Total Recoverable Chromium	mg/kg dry wt	23	19
Total Recoverable Copper	mg/kg dry wt	18	32
Total Recoverable Lead	mg/kg dry wt	13.6	30
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	17	14
Total Recoverable Zinc	mg/kg dry wt	70	121
Permethrin	mg/kg dry wt	< 0.003	< 0.004
Propiconazole	mg/kg dry wt	< 0.006	< 0.009
Tebuconazole	mg/kg dry wt	< 0.008	< 0.012
Pyrene	mg/kg dry wt	< 0.013	0.02
C7 - C9	g/m ³	< 8	< 12
C10 - C14	g/m ³	< 20	< 30
C15 - C36	g/m ³	47	360
Total hydrocarbons (C7 - C36)	g/m ³	< 70	380
Sodium Absorption Ratio (SAR)		1	1.2

Irrigation area L6 (2 ha) was constructed in the 2019-2020 monitoring period. It had not been utilised by the consent holder for irrigation prior to the soil sampling effort (Table 31).

The analysis indicated the following:

- Soluble salts and conductivity results from the soluble salts were both below the requisite LODs for both analytes.
- TR barium results ranged between 390-2,500 mg/kg, noting the 2,500 mg/kg was collected via the shallow soil core. This strongly suggests that drilling mud has been utilised for the construction of this irrigation area by the consent holder. If so, this is a breach of consent.

- TR calcium results ranged 6,700-19,300 mg/kg. The latter result is the most elevated concentration in this monitoring period, across all irrigation areas. This also suggests drilling mud origin.
- TR magnesium ranged 5,200-7,700 mg/kg.
- TR potassium ranged 1,310-2,100 mg/kg.
- TR sodium ranged 210-390 mg/kg.
- Chloride ranged 14-46 mg/kg.
- pH results were weakly basic, ranging 7.6-7.8 pH.
- TR arsenic ranged 4-7 mg/kg.
- TR chromium ranged 19-23 mg/kg.
- TR copper ranged 18-32 mg/kg. Noting the copper result for L6 shallow is the most elevated in the soil samples collected this monitoring period.
- TR lead ranged 13.6-30 mg/kg.
- TR mercury was below the LOD in both samples.
- TR nickel ranged 14-17 mg/kg.
- TR zinc ranged 70-121 mg/kg. Noting the concentration, 121 mg/kg (L6 shallow), is the most elevated in the data set of this year's soil results.
- Permethrin, propiconazole and tebuconazole were not detected above the LOD.
- In terms of PAHs, no analytes were recorded above the LOD. These results have not been tabulated.
- For TPH, carbon chain C15-C36 was recorded in both samples from L6, ranging 47-360 mg/kg.
- Sodium absorption ratio remained low, close to or at 1.

Drilling mud pad material spot samples

Four spot samples were collected from the drilling mud pad, to assess the levels of contaminants. This material had been removed from pad 3 and was stored adjacent to the irrigation pond, in a bunded area, connected to the wash down pad. The consent holder had been turning the material to stimulate a reduction in petroleum hydrocarbons.

Table 32 Spot samples from drilling mud pad (3) material

Spot samples drilling mud pad		RNZ 1	RNZ 2	RNZ 3	RNZ 4
Parameter	Unit / Date	5/08/2021	5/08/2021	5/08/2021	5/08/2021
Dry Matter	g/100 g as rcvd	60	53	54	56
Soluble Salts	g/100 g dry wt	0.09	0.11	0.14	0.16
Electrical Conductivity (EC)	mS/cm	0.2	0.3	0.4	0.4
Total Recoverable Barium	mg/kg dry wt	3,800	3,400	3,800	3,500
Total Recoverable Calcium	mg/kg dry wt	31,000	46,000	40,000	41,000
Total Recoverable Magnesium	mg/kg dry wt	5,600	5,100	5,400	5,700
Total Recoverable Potassium	mg/kg dry wt	2,100	2,300	2,300	2,300
Total Recoverable Sodium	mg/kg dry wt	400	430	450	480
Chloride	mg/kg dry wt	101	100	167	200
pH	pH Units	8.3	8.5	8.4	7.8
Total Recoverable Arsenic	mg/kg dry wt	19	23	23	24
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.17	0.22	0.16
Total Recoverable Chromium	mg/kg dry wt	44	47	49	47
Total Recoverable Copper	mg/kg dry wt	60	65	68	67

Spot samples drilling mud pad		RNZ 1	RNZ 2	RNZ 3	RNZ 4
Parameter	Unit / Date	5/08/2021	5/08/2021	5/08/2021	5/08/2021
Total Recoverable Lead	mg/kg dry wt	42	47	52	49
Total Recoverable Mercury	mg/kg dry wt	0.34	0.42	0.47	0.45
Total Recoverable Nickel	mg/kg dry wt	18	17	18	18
Total Recoverable Zinc	mg/kg dry wt	162	152	172	176
Permethrin	mg/kg dry wt	0.35	1.04	0.66	0.85
Propiconazole	mg/kg dry wt	1.11	2.5	2.3	2.4
Tebuconazole	mg/kg dry wt	1.89	4.3	4.4	4
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.5	< 0.5	< 0.5
1-Methylnaphthalene	mg/kg dry wt	< 0.017	< 0.019	< 0.018	< 0.018
2-Methylnaphthalene	mg/kg dry wt	0.029	0.033	0.026	0.021
Perylene	mg/kg dry wt	< 0.017	< 0.019	< 0.018	< 0.018
Phenanthrene	mg/kg dry wt	< 0.017	< 0.019	< 0.018	< 0.018
Pyrene	mg/kg dry wt	0.02	0.022	< 0.018	< 0.018
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	< 10	< 12	< 11	< 11
C10 - C14	mg/kg dry wt	136	171	134	80
C15 - C36	mg/kg dry wt	810	920	710	490
Total hydrocarbons (C7 - C36)	mg/kg dry wt	940	1,090	840	570

The four spot samples from the drilling mud pad (Table 32) indicated the following:

- Soluble salts ranged 0.09-0.16 g/100g (900-1,600 mg/kg).
- Electrical conductivity ranged 0.2-0.4 mS/cm.
- TR barium remained quite stable across the four spot samples, ranging 3,400-3,800 mg/kg.
- Total calcium showed slightly more variation, though all four samples indicated elevated calcium, ranging 31-46,000 mg/kg.
- TR magnesium and potassium remained relatively stable across the four samples, ranging 5,100-5,700 mg/kg and 2,100-2,300 mg/kg respectively.
- TR sodium was stable across the four samples and elevated, ranging 400-480 mg/kg.
- Chloride ranged 100-200 mg/kg.
- pH results were all weakly basic to basic (7.8-8.5 pH).
- TR arsenic results ranged 19-24 mg/kg.
- TR cadmium was measurable, ranging 0.16-0.17 mg/kg.
- TR chromium was stable, ranging 44-49 mg/kg.
- TR copper ranged 60-68 mg/kg.
- TR lead ranged 42-52 mg/kg.
- TR mercury was measurable, ranging 0.34-0.47 mg/kg.
- TR nickel ranged 17-18 mg/kg.
- TR zinc ranged 152-176 mg/kg.

Heavy metals apart from arsenic (>20 mg/kg) comply with current grade A bio solid limits¹¹. However, noting the guidelines¹², if one element is in category B, which in this case is arsenic, then all heavy metals must be graded category B (Table 33).

Table 33 Table 7.1 from NZWWA Guidelines for the safe application of biosolids to land in New Zealand 2003

Table 7.1: Biosolids classification, by metal contaminant levels

Parameters	Soil limit or ceiling concentrations ¹ (mg/kg dry weight)	Biosolids limits ²	
		Grade a max. concentration ³ (mg/kg dry weight)	Grade b max. concentration ³ (mg/kg dry weight)
Arsenic	20	20	30
Cadmium	1	1	10
Chromium	600	600	1500
Copper	100	100	1250
Lead	300	300	300
Mercury	1	1	7.5
Nickel	60	60	135
Zinc	300	300	1500

However, when compared to the 'draft for public comment' Beneficial use of Organic Material to Productive Land (2017), the heavy metals comply with product contaminant concentration limits¹³.

Permethrin was recorded in all samples from the drilling mud pad, ranging 0.35-1.04 mg/kg. It is an insecticide in the pyrethroid chemical family. Its origin is from light organic solvent preserved (LOSP) wood shavings. LOSP treated timber is, for the most part, treated with permethrin, propiconazole and tebuconazole. This will be discussed in the incidents section.

Propiconazole and tebuconazole were recorded in all four samples, ranging 1.11-2.5 mg/kg and 1.89-4.4 mg/kg respectively. Both these compounds are fungicides.

In terms of PAHs, trace concentrations of 2-methynaphthalene (ranging 0.021-0.033 mg/kg) and pyrene (0.02 and 0.022 mg/kg) were recorded. The remaining PAHs were all below the LOD and have not been tabulated.

In terms of TPH, carbon chains C10-C14 (ranging 80-171 mg/kg) and C15-C36 (490-920 mg/kg) were recorded. In the case of C10-C14, the values recorded were in excess of the Tier 1 soil acceptance criteria for TPH agriculture all pathways (surface <1m)¹⁴ as they >58 mg/kg.

Soil sampling discussion

Soil samples were collected from all irrigation areas at two depths, shallow (7 cm bgl) and deep (37 cm bgl). In addition, soil samples from previous monitoring periods were tabulated to assess for any trends over time. When all these results are compared the following can be determined.

¹¹ NZWWA Guidelines for the safe application of biosolids to land in New Zealand 2003

¹² Section 7.1 Metals grading, page 13, NZWWA Guidelines for the safe application of biosolids to land in New Zealand 2003

¹³ Table 5-5 Product contaminant concentration limits – Beneficial use of Organic Material on Productive Land Volume 2 Guide December 2017

¹⁴ MfE Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand (revised 2011) Module 4, Tier 1 soil acceptance criteria

Total recoverable barium results indicated that area L6 shallow (Figure 21) held the highest concentration across the irrigation areas this monitoring period. The concentration recorded in area L6 shallow was only exceeded by the drilling pad spot samples (RNZ 1-4).

Noted are the shallow samples from areas U1 and L1. U1 is a long term irrigation area, while area L1 was constructed of partially composted drilling mud pad material. Hence the basis for the elevated concentrations of barium.

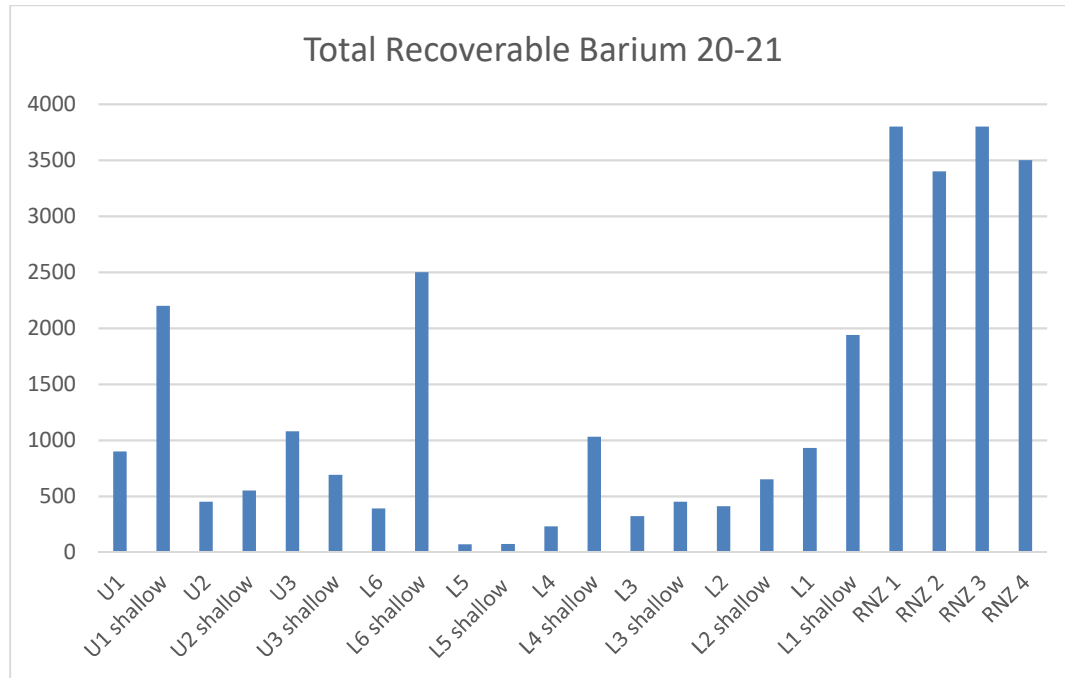


Figure 21 Total recoverable barium 2020-2021 soil analysis

Area L6 shallow however, had not been irrigated upon. This suggests that partially composted drilling mud material was utilised. The Council considers this is a breach of consent, as the discharge of drilling mud material to land is not allowed under the Regional Freshwater Plan for Taranaki unless covered by a consent.

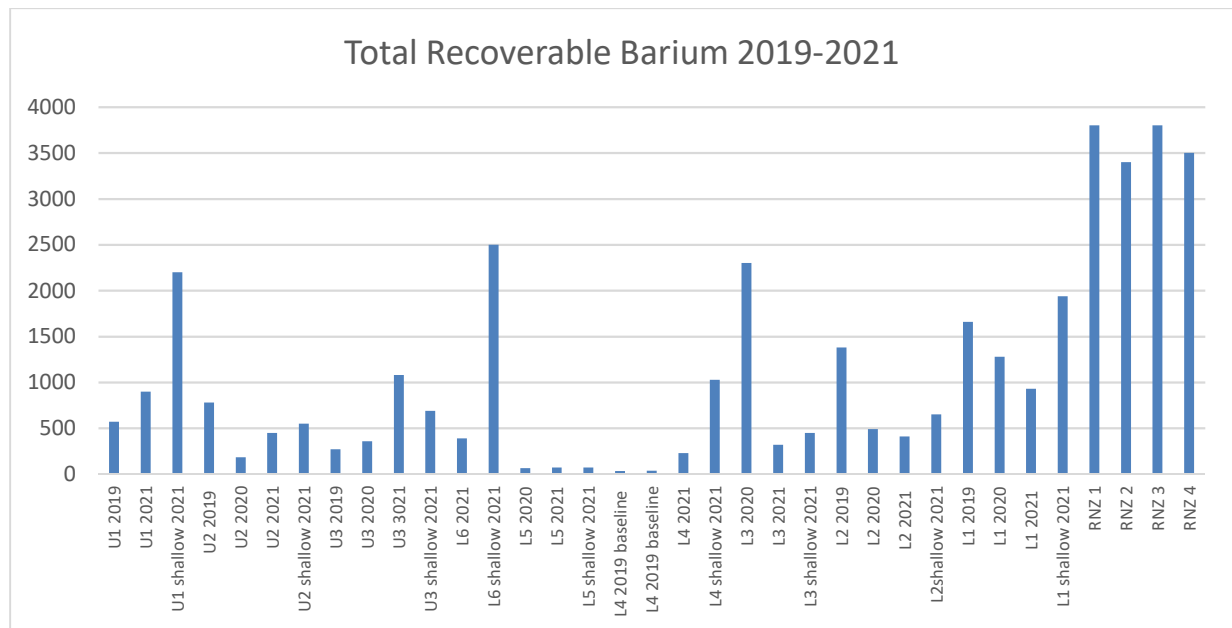


Figure 22 2019-2021 soil analysis total recoverable barium by irrigation area

When compared to the long term analysis (Figure 22), the concentrations held in L6 shallow exceed all previous barium tested irrigation areas. Within both figures (21 and 22), background barium concentrations can be found in area L5 and L5 shallow for comparison, they can also be observed in area L4 2019 baseline. Figure 22 encapsulates the effects of the irrigation fluid on the soil within the Company site over time.

Chloride analysis over time has observed some significant decreases in soil chloride concentrations (Figure 23). In the 2018 and 2019 monitoring periods, the concentrations of chloride in the irrigation areas L1, 2 and 3 were trending up. More recent analysis has determined that these areas appear to be trending down in chloride concentrations.

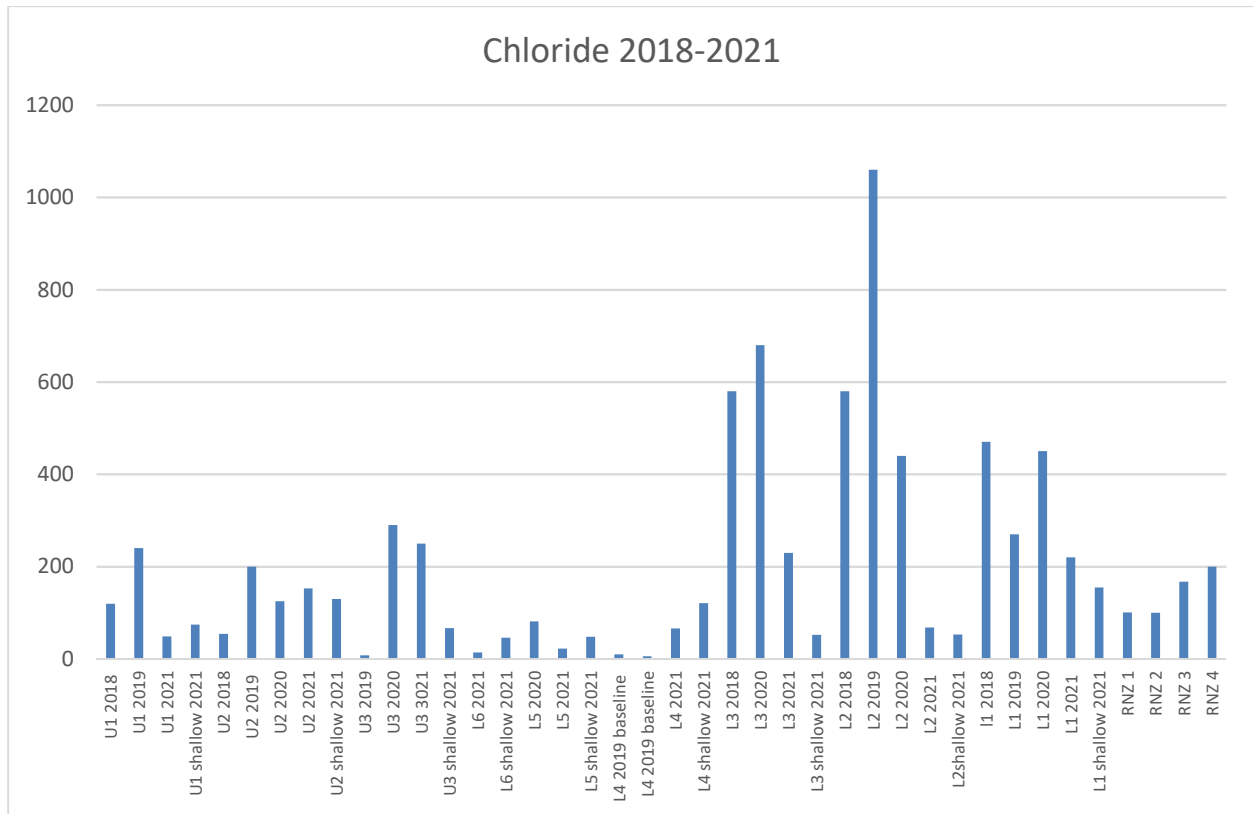


Figure 23 Soil chloride concentrations by irrigation area 2018-2021

Soil sodium results (Figure 24), in similarity to the chloride, have also recorded a reduction in concentration over time. This was observed in area L2 and to a certain extent L3, which recorded a significant reduction in soil sodium since 2018. Though noted in the case of L6 shallow 2021, this area held the most elevated concentration in the 2021 data set, which was close to the concentrations recorded in the drilling mud spot samples (RNZ1-4).

In terms of arsenic within the irrigation areas (Figure 25), the concentrations observed were slightly above the predicted median background¹⁵ (2.81 mg/kg), in all samples apart from the L4 baseline 2019 samples (3 & 4 mg/kg). While they were slightly above the predicted background, they were below the 95% percentile (11.77 mg/kg). It is noted all four RNZ samples (1-4) exceeded the predicted background concentration for arsenic, as well as the 95% percentile for this heavy metal.

For chromium in soils (Figure 26), all samples were above the predicted medium background (10.44 mg/kg), but below the 95% percentile (62 mg/kg).

¹⁵ Report entitled "Background soil concentrations of selected trace elements and organic contaminants in New Zealand" (Envirolink Tools Grant: C09X1402) Landcare research limited

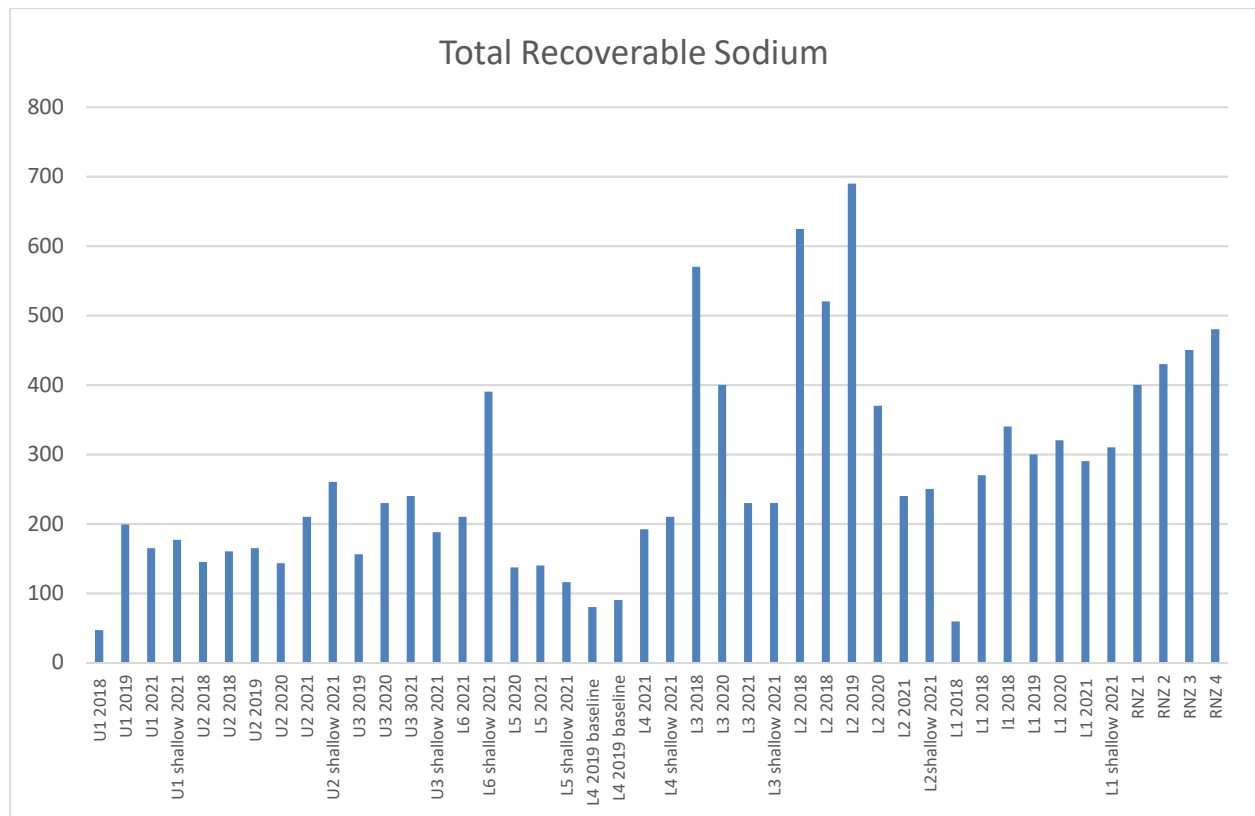


Figure 24 Total recoverable sodium results 2018-2021 by irrigation area

For copper (Figure 27), the majority of irrigation areas were below the medium predicted background concentration (14 mg/kg). However, U2 shallow 2021 (20 mg/kg), L1 shallow 2021 (26 mg/kg) and L6 shallow 2021 (32 mg/kg) exceeded the predicted median background. Noting that area L4 baseline 2019 analysis, recorded a concentration of 9 mg/kg and this should be considered a background for the site

However all results were below the 95% percentile which was predicted at 60 mg/kg. It is also further noted that Taranaki does have elevated copper in some soils in the region, which can range up to 120 mg/kg. These results, including the RNZ 1-4 are within that range (9-68 mg/kg). However the RNZ 1-4 samples may well be elevated when compared to the baseline samples from area L4 baseline 2019 (9 mg/kg).

For lead in the samples (Figure 28), predicted median background (10.44 mg/kg) was recorded at the baseline soil samples at L4 baseline 2019. All other irrigation area samples were above this limit, though below the 95% percentile (37.96 mg/kg), for Taranaki the range¹⁶ (2-30 mg/kg) was close to background in all irrigation area samples. However, in the case of the RNZ 1-4, these were all above background for Taranaki soils.

All nickel and zinc (Figure 29) results remained close to background (2-25 mg/kg nickel and 20-170 mg/kg zinc) in the case of nickel, this heavy metal has not been tabulated.

Of note, all heavy metals results were more elevated in the RNZ 1-4 spot samples from the drilling mud pad than the irrigation areas. All exceeded the site background when compared to L4 baseline 2019.

¹⁶ Maps of total soil concentrations (background levels) of chromium, copper, lead, nickel, vanadium and zinc in the Taranaki Region. LCO102/152

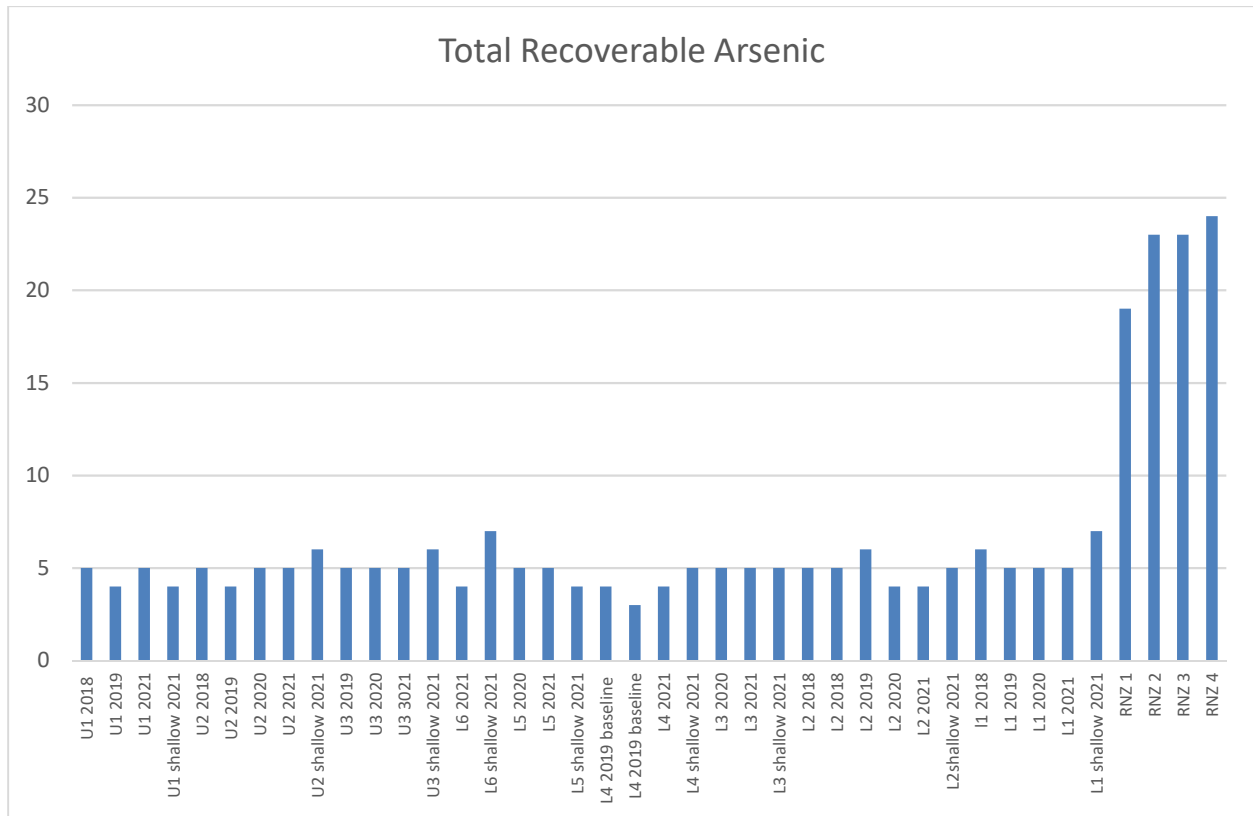


Figure 25 Total recoverable arsenic 2018-2021

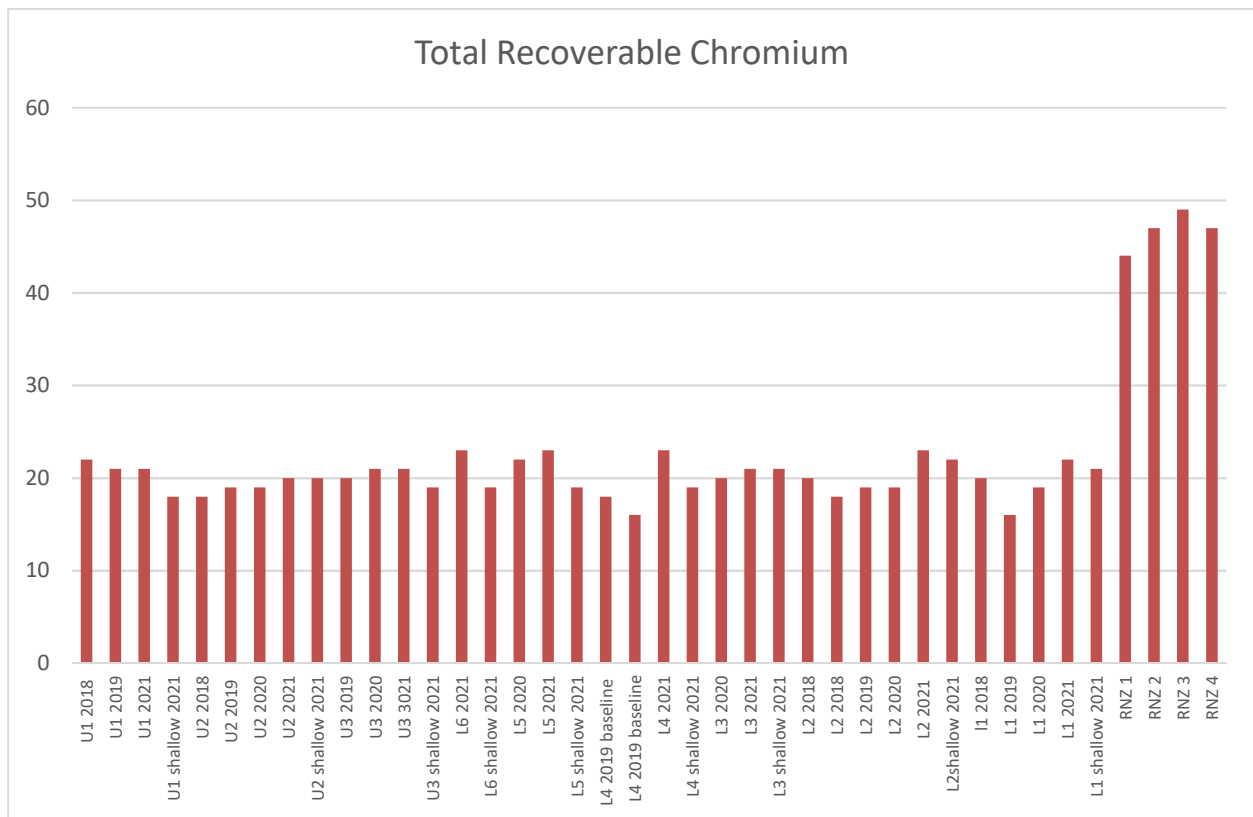


Figure 26 Total recoverable chromium 2018-2021

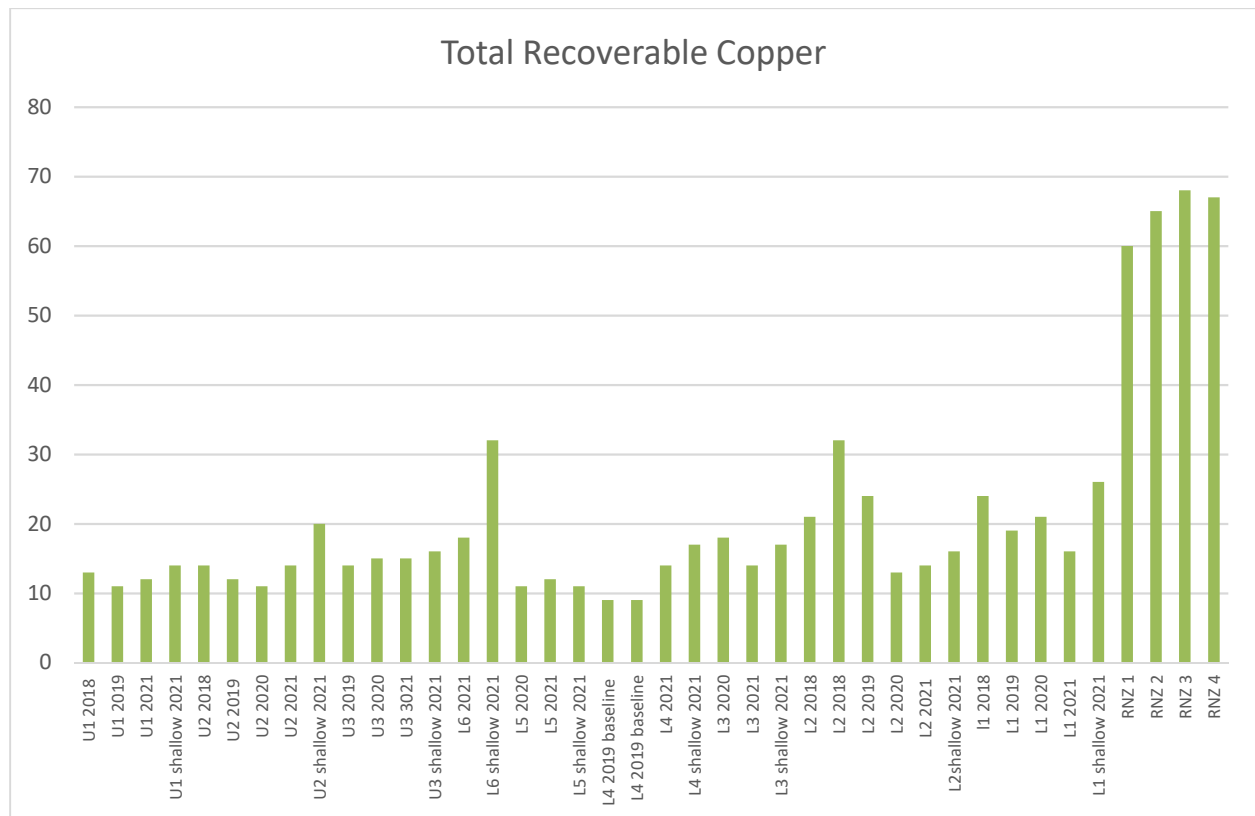


Figure 27 Total recoverable copper 2018-2021

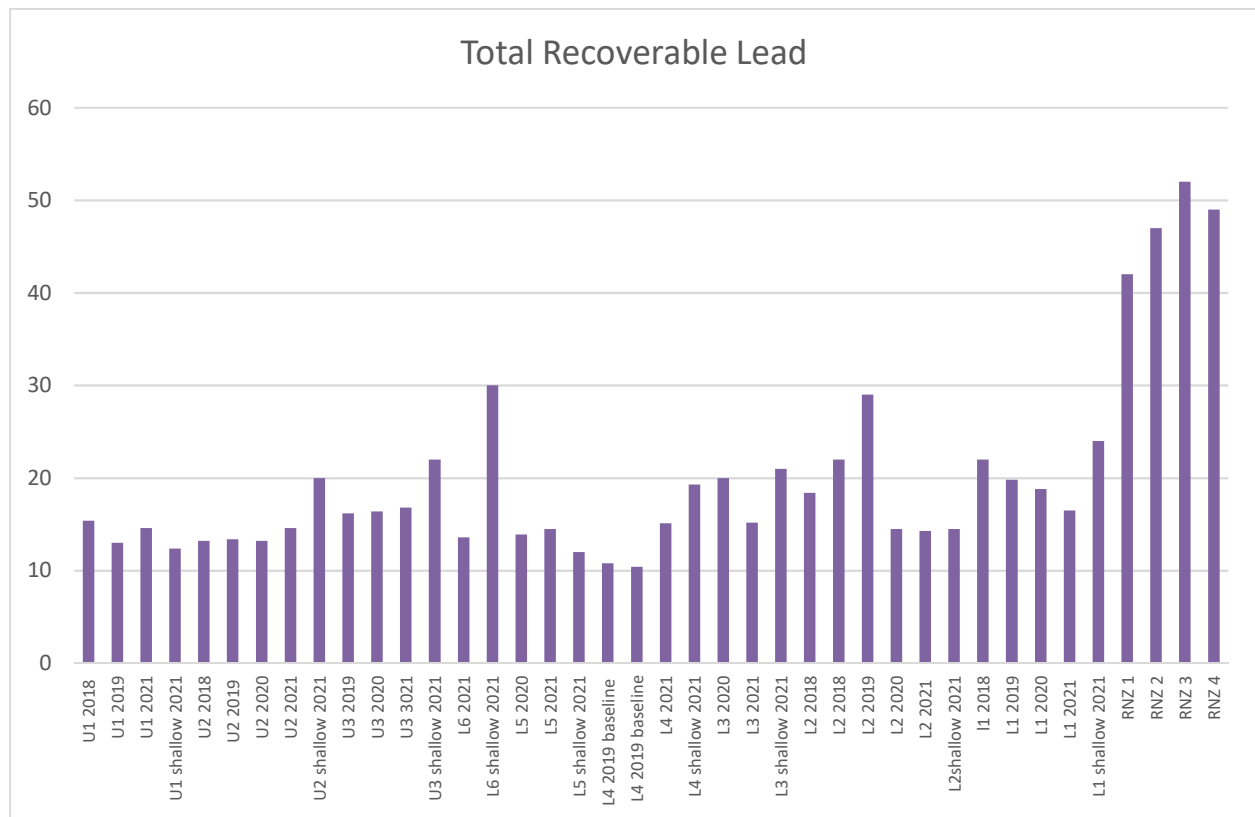


Figure 28 Total recoverable lead 2018-2021

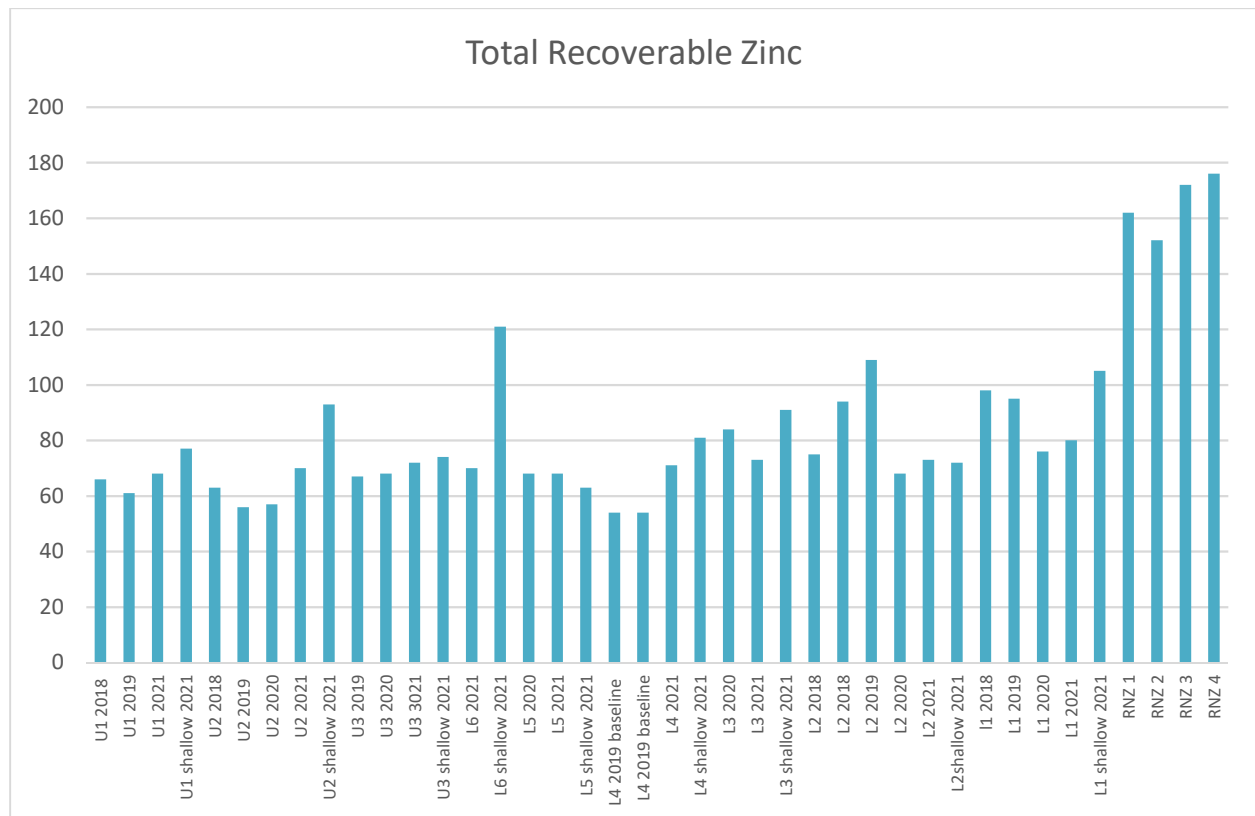


Figure 29 Total recoverable zinc 2018-2021

2.1.8 Biomonitoring of the Haehanga Stream

The following is extracted from report KC031. The full report is available upon request.

Background

The Council collected streambed macroinvertebrates (19 January 2021) from five sites in the Haehanga Stream and two sites in unnamed tributary of the Haehanga to investigate the effects of water discharges from Remediation NZ Ltd composting site on macroinvertebrate health. An additional site was sampled on the Waikekeho stream on the same day for comparative analysis against the control site at Remediation NZ composting site. The different types of macroinvertebrates from samples were identified, the number of different types counted (taxa richness), and MCI and SQMCI scores were calculated for each site.

Table 34 Biomonitoring sites in the Haehanga Stream catchment including reference location

Site	Site Code	GPS coordinates (Easting-Northing)	Location
1	HHG000090	1732685-5684577	Upstream of extended irrigation area
2	HHG000100	1732272-5684972	Downstream of extended irrigation area
T2	HHG000098	1732747-5685043	Upstream of wetland discharge point
T3	HHG000103	1732692-5685042	Downstream of wetland discharge point
5	HHG000115	1732124-5685478	25 m downstream of last pond and swale collection area
6	HHG000150	1731673-5685796	30 m downstream of lower irrigation area
7	HHG000190	1731611-5686514	50 m upstream of State Highway 3 bridge
RS	WKE000800	1708827-5635027	10 m upstream of old Ri Rd. bridge

Method

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of nutrient pollution in streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to pollution. The SQMCI accounts for taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. Significant differences in either the MCI or the SQMCI between sites indicate the degree of adverse effects (if any) of the discharges being monitored and enable the overall health of the macroinvertebrate communities to be determined.

Table 35 Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	500+

Table 36 Macroinvertebrate health based on MCI and SQMCI ranges which has been adapted for Taranaki streams and rivers from Stark's classification (Stark, 1985 and Stark and Maxted, 2007)

Grading	MCI	SQMCI
Excellent	≥140	≥7.0
Very Good	120-139	6.0-6.9
Good	100-119	5.0-5.9
Fair	80-99	4.0-4.9
Poor	60-79	3.0-3.9
Very Poor	<60	<3.0



Figure 30 Map of the lower sites in the Haehanga Stream

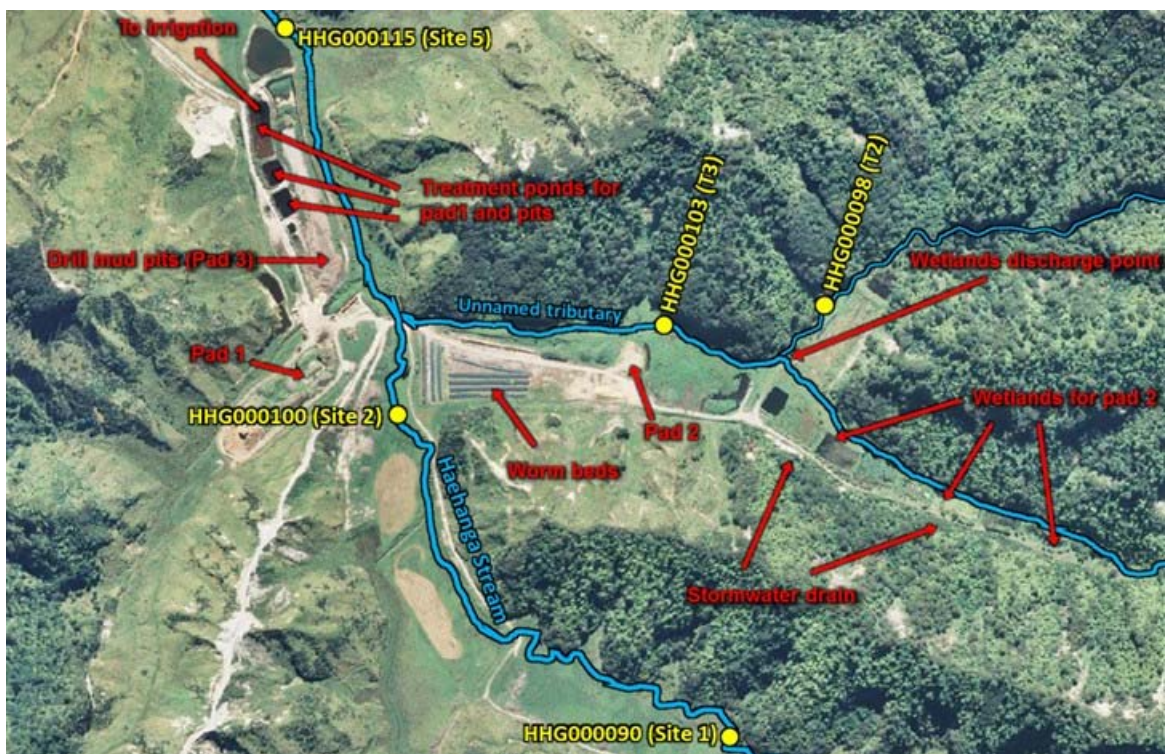


Figure 31 Map of upper Remediation NZ Ltd activities and sample sites



Figure 32 Map of the reference site in relation to Remediation NZ Ltd. Small reference site box, outlined in red, is enlarged to show the Waikekeho stream and Uruti river

Table 37 Number of taxa, MCI and SQMCI values recorded in the Haehanga Stream catchment together with a summary of results from control sites in other small lowland hill country streams (LOWL) between 25-49 MASL, in Taranaki (TRC, 1999) (Updated to September 2019) and Site RS

Site	No. of surveys	Numbers of taxa				MCI values				SQMCI values			
		Median	Range	Previous	Current	Median	Range	Previous	Current	Median	Range	Previous	Current
LOWL*	28	22	12-30	-	-	76	62-109	-	-	4.1	2.6-7.2	-	-
1	2	14	12-16	16	14	67	63-71	71	73	3.3	3.1-3.4	3.1	2.6
2	24	19	15-23	17	16	74	62-99	67	89	4.0	2.7-5.7	3.5	3.8
5	23	19	6-28	19	15	73	53-88	68	87	3.0	1.1-4.1	4.0	4.3
6	10	18	6-24	19	16	69	57-88	66	75	2.9	1.0-3.9	3.9	4.0
7	19	20	12-30	20	17	70	56-82	70	73	3.3	1.3-4.3	3.6	3.9
T2	11	22	18-30	20	19	86	79-104	79	105	5.1	3.8-7.2	3.8	5.6
T3	12	26	18-32	18	19	83	78-93	82	85	4.4	3.5-5.4	4.4	4.2
RS**	1	-	-	-	20	-	-	-	97	-	-	-	4.2

Discussion and conclusion

The Council's standard 'streambed kick' and 'vegetation sweep' sampling techniques were used at seven established sites to collect streambed macroinvertebrates from the Haehanga Stream catchment in order to assess whether the Remediation (NZ) Ltd composting areas had any adverse effects on macroinvertebrate communities of these streams. An additional site was sampled in an adjacent catchment with which to compare results, as the previous control site has become impacted by land irrigation, and the current

control site was not reflective of the downstream site habitat. Samples were processed to provide number of taxa (richness), MCI, and SQMCI scores for each site.

The macroinvertebrate survey conducted on 19 January 2021 observed flows in the Haehanga catchment to be relatively low, with very slow moving or still water at some sites. The water had a brown tannin colouration at the head of the catchment, which became increasingly cloudy at the most downstream site. Undesirable heterotrophic growths were not recorded at any of the seven sites surveyed.

Site 1 has exhibited consistently low macroinvertebrate health scores, as predicted, due to the poor habitat quality in the upper reach of the stream. This section of the stream is not fenced off from livestock. It is worth noting that major earthworks, new consented activities, and livestock damage have compromised the control site multiple times in the past. Because of this, the control site has been moved upstream to a highly variable site with poor macroinvertebrate habitat quality. The habitat at site 1 supports more 'tolerant' taxa, which is expected given this area is marshland habitat with pools and no discernible flow. It has a soft bottom, often grass with no cobble or boulder, very little wood debris, and no bed shading, which is largely unrepresentative of downstream sites in many regards. Therefore, there is little value in comparing site 1, which is expected to have low community health scores (Figure 31), to the downstream sites, which have higher quality habitat (more gravel, cobble, wood debris, riffles, and bed shading) and would be expected to have higher macroinvertebrate health scores under natural conditions.

Therefore, another site was established in a similar catchment arising from the hill country that is more representative of the downstream sites in the Haehanga stream for comparison. The reference site (WKE000800) (Figure 32) returned a MCI result that was higher than any site in the main stem of Haehanga Stream and was significantly higher (21 units) than the median for other lowland hill country sites. This is likely a reflection of the area's topography and the site's relative proximity to the headwaters where the cumulative effects of agriculture or other consented activities are low. This site is a better representation of lowland, hill country streams of the area like the Haehanga Stream and its tributaries.

In general, the communities in the Haehanga Stream sites had relatively low proportions of sensitive taxa, which is expected in small, soft-bottomed streams such as the Haehanga Stream. MCI values recorded in the Haehanga Stream showed a significant decrease in a downstream direction. Significant drops in MCI were recorded below the wetland treatment system discharge at site T3 when compared to site T2 and below the irrigation areas at site 6 and 7 when compared to site 2. These results indicate that these consented activities may have a negative effect on the macroinvertebrate community. Despite this decrease, the MCI scores at all sites were higher than what was recorded in the previous survey, indicating some interim improvement. The lowest MCI score in the current survey was recorded at site 1 and 7 (73 units) and the highest at site T2 (105 units). All sites recorded MCI scores above their respective medians with sites 2, 5, and T2 having MCI scores significantly higher than their respective medians.

Site T2 had the highest MCI (105 units) and SQMCI (5.6 units) scores of all the sites sampled. While the amount of habitat available covered a small area, the quality of the habitat was better than any of the other sites that were sampled. Site T3, below the wetland discharge, was significantly lower in both MCI (-20 units) and SQMCI (-1.4 units) scores. This indicates that the wetland discharge may have a marked negative impact on the unnamed tributary. Both sites surveyed in the unnamed tributary contain riffle habitat throughout but exhibit some differences in substrate composition. Site T2 contains less silt with more fine and coarse gravel as well as cobble compared with site T3. The increased amount of silt at site T3 may be a result of the wetland discharge in combination with the poor rain-water management near the site which would likely have a negative impact on the macroinvertebrate community. The tributary was mostly shaded due to channelization as well as overhanging vegetation on the northeast side, which deters the growth of periphyton and 'undesirable' heterotrophic growths. Bed shading also results in a lower water temperature. The quality of water in this tributary is likely higher than the other sites sampled in the main stem Haehanga, given that the tributary is fed by water runoff from mostly unaltered hill country bush above the wetland

discharge. Site T3 exhibits an MCI and SQMCI congruent to the other impact sites upstream of the pad 3 irrigation area despite the higher habitat quality, further indicating that the wetland discharge has negative effects on the stream.

During previous surveys, Chironomus bloodworms have been recorded as abundant at various sites in the past and were present at the in the current survey at sites 6 and 7. Abundance of this taxon is usually an indication of an organic discharge, although low dissolved oxygen in the stream can also allow this taxon to dominate the community, especially when this is associated with low flows. It may be then that the sporadic appearance of Chironomus in abundance is at least in part related to the low dissolved oxygen concentrations. Dissolved oxygen concentrations in the Haehanga have been found to be depressed at times, and during the warmer months, when there is more aquatic weed growth, dissolved oxygen may be significantly depleted at night. This is a natural occurrence in some streams that are slow flowing and weedy. Any macroinvertebrate surveys undertaken when such conditions exist could potentially record a community with fewer sensitive species, and a more abundant population of Chironomus. Any works that improve water quality are also likely to lead to an improvement in freshwater macroinvertebrate communities below the discharges, and should continue to be encouraged.

All sites in the main stem Haehanga lack bed shading during most of the day. This may cause water temperatures to rise outside the thermal preference and, in some cases, tolerance of many stream dwelling species. Temperatures have been recorded as high as 28°C during summer months in previous surveys. Extreme temperatures are often paired with low flow conditions and low macroinvertebrate community health scores. Unshaded streambeds also promote algal growths which were reported as abundant at the lower sites. Site T2 in the unnamed tributary historically has the highest macroinvertebrate health scores and has a mostly shaded bed with much lower temperatures in the Spring, Summer, and Autumn months compared to the main stem Haehanga. The increased temperature and increased algal growth reported in previous reports is likely contributing to the negative downstream trend in the macroinvertebrate community over the past few surveys. The reference site (WKE000800) is well shaded and recorded a temperature 3.4°C lower than site 1 and was the lowest temperature recorded in the survey.

Overall, macroinvertebrate community health in the Haehanga has improved compared to the previous survey; however, MCI declines significantly downstream of consented activities such as the wetland treatment system discharge as well as the irrigation areas. Additionally, affected sites (T3, 2, 5, 6, and 7) exhibit lower macroinvertebrate community health scores than what was recorded at a reference site in a similar catchment in the area: significantly lower at the two most downstream sites (6 and 7). This suggests that the wetland treatment system discharge, storm water run-off, or potential leachate run off / through flow from the irrigation areas into the Haehanga stream are likely contributing to the decline in macroinvertebrate health.

There are many biotic and abiotic factors, including various consented activities of Remediation (NZ) Ltd that can affect macroinvertebrate community health in this stream. It is recommended that Remediation (NZ) Ltd continue undertaking actions to increase the efficacy of the stormwater management system as well as the treatment systems on site to improve water quality and decrease loadings of pollutants in the receiving waters.

Likewise, Remediation (NZ) Ltd should also continue undertaking actions that increase the habitat quality of the stream by better maintenance of the riparian margin through stock exclusion from all parts of the Haehanga Stream within the property and riparian planting. These actions will reduce the growth of periphyton and maintain the temperature of the stream to a reasonable level of seasonal variation. This will also help to reduce the amount of sedimentation that occurs at the lower sites, which will result in higher quality habitat.

2.2 Air

In relation to a number of complaints concerning air quality and a direct request from a submitter concerning certain emissions from the site. The Council undertook three separate short term air quality surveys. The results of which are conveyed below. Full reports are provided on request.

[Air monitoring survey of hydrocarbon compounds \(BTEX\) around NZ Ltd site \(30 October 2020\)](#)

The survey was undertaken due to concerns raised by neighbours of the composting site, concerning off site air quality impacts from the operation on their health.

The potential impacts to air of drilling waste and associated benzene, toluene, ethylbenzene and total xylene (BTEX) contained within it, were of concern to some neighbours, particularly under cold air drainage conditions.

The composting site and the location of nearest receptors are shown in Figure 33.

A 20 day passive absorption disc survey was undertaken at the sampling sites shown in Figure 33. Passive absorption samplers, that absorb target gases into activated carbon, were used to collect the samples.

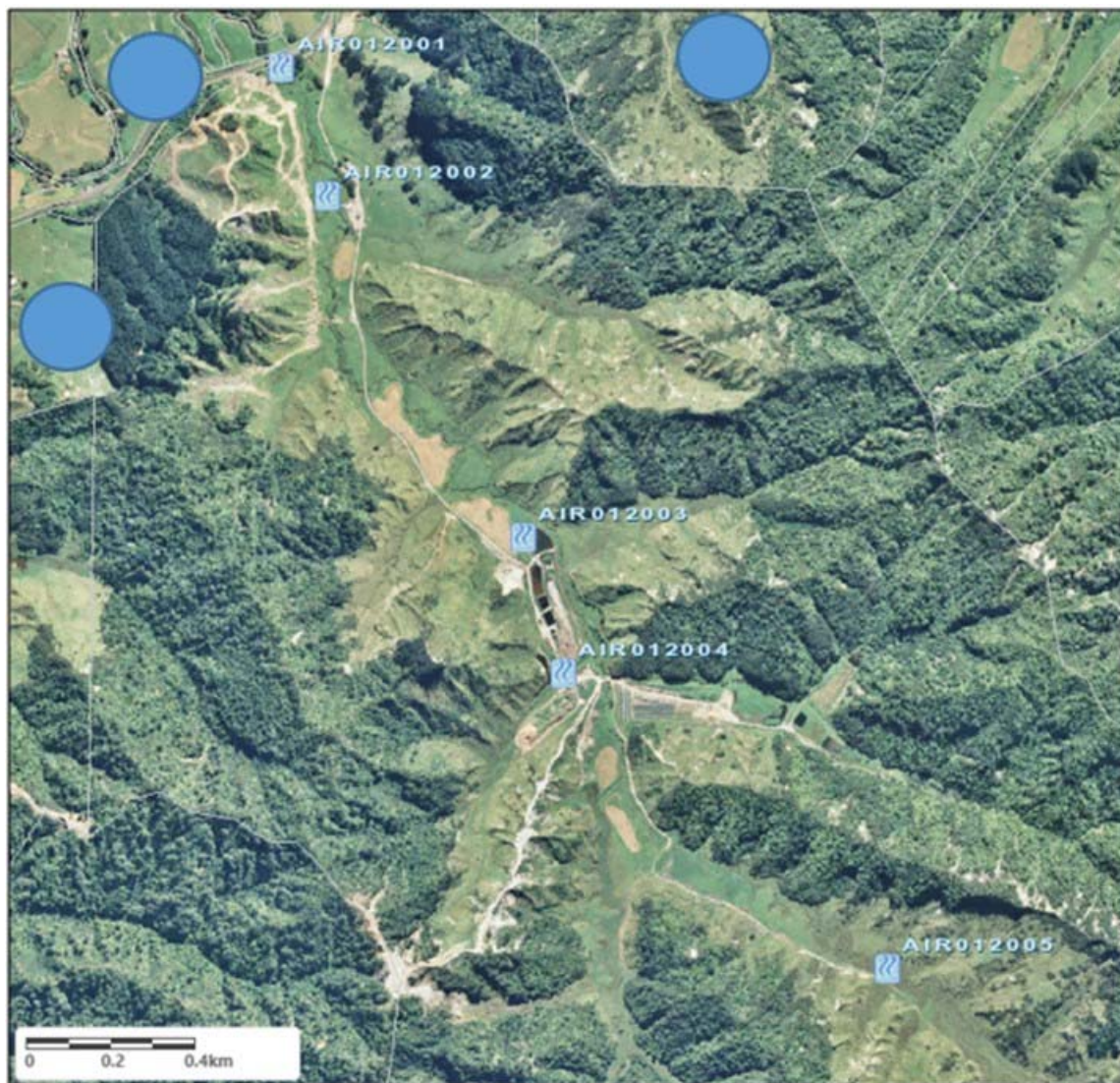


Figure 33 Location of BTEX passive absorption discs and nearest receptors (circles)

The results of the BTEX passive disc survey were as follows (Table 38):

Table 38 Actual and recalculated (using a conversion factor of $p=0.2$) BTEX results around Remediation NZ

Site ID / Where	Time total Hrs.	Benzene ($\mu\text{g}/\text{m}^3$)			Toluene ($\mu\text{g}/\text{m}^3$)		Ethyl Benzene	o,m,p – ($\mu\text{g}/\text{m}^3$) Xylene Total	
		Lab. Results	1 hr. Calc.	8 hr. Calc.	Lab. Results	1 hr. Calc.	Lab. Results	Lab. Results	1 hr. Calc.
AIR012001	478	<0.31	<1.06	<0.70	0.50	1.72	0.05	0.32	1.10
AIR012002	478	<0.31	<1.06	<0.70	0.52	1.79	0.05	0.36	1.24
AIR012003	478	<0.31	<1.06	<0.70	0.70	2.40	0.08	0.60	2.06
AIR012004	478	<0.31	<1.06	<0.70	0.81	2.78	0.09	0.70	2.40
AIR012005	477	<0.31	<1.06	<0.70	0.24	0.82	<0.04	<0.09	<0.31
Blank	480	<0.31	<1.06	<0.70	0.19	0.65	<0.04	<0.09	<0.31
MfE recommended guidelines (2000), one-hour average ($\mu\text{g}/\text{m}^3$)			22			500			1000

The results (Table 38) demonstrate that BTEX concentrations were well below the MFE 2000 guidelines for air quality. This included around the areas where higher levels were expected (around the compost pile, leachate ponds and SH3).

Conclusion of passive disc survey for BTEX emissions at Uruti site

There are no grounds for public health concerns about hydrocarbons (BTEX) arising from the site at Uruti during the sampling period.

Ambient 'MultiRae' gas meter survey at Remediation NZ Ltd 6-10 October 2020

In relation to observations conveyed of an egg/sulphur type odour from both neighbours and inspectors a MultiRae photoionisation detector (PID) was deployed in close proximity to the irrigation pond (IND002044). The unit was deployed from 6 – 11 October 2020.

The results indicated the following

Table 39 MultiRae survey results October 2020

	NH3 (ppm)	VOC (ppm)	CO (ppm)	LEL (%)	H2S (ppm)
Min	0.0	0.0	0.0	0.0	0.0
Max	2.0	0.1	6.0	3.0	1.4
Mean	0.14	0.0	0.0	0.26	0.0

Table 39 demonstrated the in close proximity to the irrigation pond measurable concentrations of the following gases were identified:

- Ammonia (NH_3) on multiple occasions, peaking at 2 ppm.
- Volatile organic compound (VOC) on one occasion, which peaked at 0.1 ppm.
- Carbon monoxide (CO) was recorded on two occasions, peaking at 6 ppm.
- Lower explosive limit peaked at 3%.
- Hydrogen sulphide was recorded on one occasion at 1.4 ppm.

Upon the identification of H₂S, the Company were asked to engage a suitably qualified consultant to mitigate their odour issues. Pattle Delamore and Partners (PDP) were engaged to provide odour advice. A draft document 'Odour Advice For The Uruti Composting and Vermiculture Facility' was received by the Company in late December 2020. This was communicated to the Council with assurances from the Company that the recommendations given by the draft document would be put into effect. It was noted by the Council that by the end of the monitoring period covered by this report, that the measures were yet to be fully implemented.

Taranaki Regional Council PID (MultiRae) ambient air quality survey 19-23 April 2021

Following a raft of odour complaints received by the Council, a second deployment of the PID was undertaken. On this occasion the unit was fitted to a fence post, opposite the site offices and weighbridge, some 1,000 m down gradient from the irrigation pond.

The unit was deployed from 19-23 April 2021. The unit did not record any analytes above the limit of detection for the instrument (% LEL or PPM). However, odour complaints did continue, with 27 odour complaints logged by the Council after the completion of this survey. One complaint did result in the finding of objectionable odour, beyond the boundary of the site (17 June 2021).

2.3 Incidents, investigations, and interventions

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the Company. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach, that in the first instance avoids issues occurring, is favoured.

For all significant compliance issues, as well as complaints from the public, the Council maintains a database record. The record includes events where the individual/organisation concerned has itself notified the Council. Details of any investigation and corrective action taken are recorded for non-compliant events.

Complaints may be alleged to be associated with a particular site. If there is potentially an issue of legal liability, the Council must be able to prove by investigation that the identified individual/organisation is indeed the source of the incident (or that the allegation cannot be proven).

Table 40 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the consent holder's activities during the 2020-2021 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 40 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
01 July 2020- 30 June 2021	78 ¹⁷ complaints were received concerning an offensive odour beyond the boarder of the site offensive	Y	Compliant at time of inspection ¹⁸	None required
02 October 2020 20:45	5 complaints were received concerning an odour at the Uruti worm farm. An odour survey was undertaken and it was found that there was objectionable odour beyond the boundary of the site. The odour was traced to the irrigation pond	N	- Yes	<ul style="list-style-type: none"> - Letter of explanation requested - Abatement notice issued - Infringement notice issued
14 October 2020 12:00	During routine monitoring of a composting facility at Uruti, it was found that unauthorised waste material had been deposited at the site (specifically waste oil and associated sludge) in contravention of resource consent conditions. It was also found that green waste had been stored within the clean stormwater collection area outside of the designated storage areas. An abatement notice was issued requiring all products collected for disposal are disposed of in compliance with section 15 of the Resource Management Act 1991.	N	- Yes	<ul style="list-style-type: none"> - Abatement notice issued requiring all products collected for disposal are disposed of in compliance with section 15 of the Resource Management Act 1991. - Infringement notice issued

¹⁷ In some cases multiple complaints were made at or within a few hours of each other, as such these are recorded as one compliant line as they concerned the same thing.

¹⁸ It should be noted that in some cases complaints were made and staff attending the call outs were unable to detect odours from the consent holder's site. This led to frustration for members of the public making the complaints. As a result, Council officers did not feel safe attending call outs late at night, which as a consequence led to a curfew being installed, negating the Council officers from attending complaints at the site between 18:00 and 06:00. This meant that officers attended complaints from the previous evening the following morning at 06:00.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
30 October 2020 06:00	<p>A complaint was received regarding odour discharging from a composting site on Mokau Road, Uruti.</p> <p>An odour survey was undertaken and objectionable odour was found beyond the boundary of the site.</p> <p>A site visit was undertaken and the odour was traced to sheepskin wind-row composting on Pad 1.</p>	N	- Yes	- Infringement notice issued
11 December 2020	<p>A review of the monthly accepted materials list by the Council identified the Company had inaccurately recorded unauthorised material accepted at the site</p>	N	- Yes	- Infringement notice issued
09 January 2021 14:00	<p>Notification was received concerning a truck, with unauthorised materials, entering a composting facility site at Mokau Road, Uruti.</p> <p>Investigation found that cement washing waste had been accepted onto the site, on 9 January 2021, in contravention of resource consent conditions and Abatement Notice EAC-23628.</p> <p>A meeting was held with the Company and an explanation was received.</p>	N	- Yes	<ul style="list-style-type: none"> - Letter of explanation requested - Infringement notice issued
11 January 2021 12:30	<p>A complaint was received concerning an offensive/objectionable odour emanating from a composting facility at Mokau Road, Uruti.</p> <p>An odour survey was undertaken and offensive and objectionable odour was found beyond boundary of the site.</p>	N	- Yes	- Infringement notice issued

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
07 April 2021 19:11	<p>A complaint was received regarding odour from a composting facility at Mokau Road, Uruti.</p> <p>An odour survey was undertaken and an offensive and objectionable odour was found beyond the boundary of the site.</p>	N	- Yes	- Infringement notice issued
16 June 2021 09:00	<p>During unrelated monitoring it was found that treated sawdust was being accepted at a composting facility on Mokau Road, Uruti, in contravention of resource consent conditions.</p> <p>After investigation and sampling, it was found that Light Organic Solvent Preservatives (LOSP) treated sawdust had been received at the composting facility.</p> <p>An abatement notice was issued requiring works to be undertaken to ensure that no further treated sawdust is received at the site, and for all treated sawdust to be removed from the site.</p> <p>Re inspection to be undertaken after 16 August 2021.</p>	N	- Yes	<ul style="list-style-type: none"> - Abatement notice issued - Vast majority of material has now been bailed to prevent any on-going discharge to the environment - Infringement notice issued
17 June 2021 18:30	<p>Two complaints were received concerning odour discharging from a composting facility on the Mokau Road, Uruti.</p> <p>An odour survey was undertaken and an objectionable compost odour was found at the roadside beyond the boundary of the property.</p> <p>No odour was detected at the complainant's properties.</p>	N	- Yes	- Infringement notice issued

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
25/26 June 2021 13:05	<p>A complaint was received concerning the Haehanga Stream running foamy, near a composting site at Uruti.</p> <p>Investigation found a foamy non-odorous discharge into the Mimi Stream beyond the composting site boundary.</p> <p>An inspection was undertaken of the composting site, where the foamy discharge was observed upstream in the Haehanga Stream.</p> <p>Samples and photographs were taken.</p> <p>A follow up inspection the following morning found that the irrigation area on the composting site had been over irrigated and contaminants had ponded and discharge directly into the Haehanga Stream.</p> <p>Further samples and photographs were taken.</p>	N	- Yes	<ul style="list-style-type: none"> - Letter of explanation requested - Abatement notice issued - Infringement notice issued

3 Discussion

3.1 Discussion of site performance

Performance for discharge to land consent 5838-2.2

In terms of performance for the discharge to land consent, inspections noted that on one occasion unauthorised material had been deposited at the drilling mud pad drop off pit. The un-authorised material was waste oil. Upon questioning from the Council the Company stated it was grease trap waste, which is allowed by consent. Photos were taken and a sample was collected¹⁹. Inter-group whom discharged the material indicated to the Council it was waste oil. An abatement notice and an infringement notice were issued, to both parties.

Material was also observed to have been stored on a non-bunded area (a newly constructed pad, to allow trucks to turn around on), and overland flow marks were observed by the inspector which demonstrated that the contaminated stormwater was not controlled and likely to enter the unnamed tributary of the Haehanga Stream. An infringement notice was issued. The potential for this to occur had been conveyed by the inspector prior to the occurrence.

The corresponding monthly inwards good register was reviewed by the Council the following month. The Company had inaccurately described the waste oil as grease trap waste. The Company were infringed again for the falsification of record keeping.

The Company took the decision to cease the acceptance of oil and gas waste, as well as any petroleum contaminated material to site on the 31 December 2020. In early January 2021, a truck with the markings of an oil and gas company was observed by a concerned neighbour entering the site at Uruti. The corresponding investigation by the Council identified that the cement washings had originated from a gas well site. These had been discharged into the drilling mud pad drop off pit.

This was in contravention of the consent as there was no allowance for this material to be accepted at the site. The Company were again infringed for this oversight, as well as being in breach of an abatement notice.

A notification was received by the Council that the Company had been willingly accepting treated sawdust at the site. Discussions with the supplier determined at least five years of supply had been received at the Uruti site. Compost analysis suggests that this material had been accepted for at least 15 years.

An investigation of the large saw dust pile on the greenwaste pad (pad 1) identified material to be a mix of light organic solvent preserved (LOSP) wood shavings (sawdust) as well to a lesser extent copper, chromium and arsenic (CCA) treated wood shavings. Both these treatments are utilised in the building industry to prevent wood from being degraded by biological means in the environment.

The wood shaving were provided to a drilling mud company as means of enabling the transport of drilling waste to the site for proposed composting. It also served the purpose for prevent drilling waste from reaching the ground if there was spillage on a well site.

It is doubted whether this material can actually be composted, noting the constituents of treated timber are as such to prevent biological activity occurring.

The Company were abated to cease the acceptance of this material and to remove it from site, as so to prevent an ongoing discharge of this material to the site and the surrounding environment. They were also infringed for accepting unauthorised material, noting this was also in contravention of the facility management plan which states that no treated saw dust was to be accepted at the site.

¹⁹ The sample of waste oil was never analysed as Intergroup stated the material was waste oil.

The Company did not remove the material from the site, stating there were unsure where to send it. They proposed to bale all of the sawdust. To date, the vast majority has been baled and remains on site. A smaller portion, was added to the drilling mud pad and is being analysed for possible contaminants.. However, this occurred outside of the monitoring period and will be discussed in the following annual report. At the time of writing enforcement is being considered.

In terms of the baled treated sawdust, this remains on site, as the Company seeks to identify a path forward for the disposal of the material.

In the final month of the monitoring year (June 2021) a complaint was received by the Council concerning foaming of the Haehanga Stream. The corresponding inspection identified an irrigator had been in operation for far too long, as surface water ponding was observed in the lower irrigation area L1. This had been undertaken for such an extended period of time as to have caused overland flow from the irrigation area in to the Haehanga Stream. A letter of explanation was requested, an abatement notice and an infringement notice were issued. The effects of the above will be discussed in the following section.

Inspections

In terms of inspections throughout the year, it was noted that material was still being deposited directly to the drilling mud pad drop-off pit, and left for a period of time, prior to composting on the DMP / Pad 3. This occurred for the majority of the monitoring period, and was inconsistent with information the Company had submitted with their ongoing consent renewal, which stated material would be directly composted on arrival.

The Company accepted that the drop-off pit and associated sediment pond would no longer be required by April 2021, and undertook to de-sludge the ponds and remove any contamination, prior to infilling the pit and pond. However, liquid wastes, in the form of egg waste were still received in the pit while further developments were completed. This was still the case in June 2021.

Discussions with the Company identified the need to address the ponding of leachate at the northern end of the drilling mud pad within the ring drain, as well as to pay attention to silt traps and sediment ponds, to clean them out, as required by consent. These actions were completed by the February 2021 inspection round. However, further prompting about remedying the stormwater ponding was required in April 2021.

The truck wash down retention pond was found to be full of solids and was also prompted to be cleaned out by the Company.

Often there was a need to prompt and inform the Company to undertake actions as required by the consent or by facility management plan. In future, it is expected that the Company will be proactive in taking any necessary action to ensure it is operating in line with such requirements.

Site developments

Works had been undertaken on Pad 1 (greenwaste pad) to lift the level of the centre of the pad, to enable better separation for stormwater from the composting windrows.

A new lower irrigation area was created in this monitoring period (termed L6), in order to achieve this, an unnamed tributary of the Haehanga was realigned. The associated culvert, which had been installed prior to the Company involvement with the site, was replaced with engineered rockery that allowed for fish passage, as well as a culvert. Grass strike was observed during the April 2021 inspection round.

The paunch pond had also been re-bunded with a larger bund constructed around the outside of the pond. This was aimed at negating any potential for the pond to overtop, which would affect the unnamed tributary of the Haehanga Stream which is in close proximity. There was also discussions held about decreasing the overall footprint of the paunch pond to negate excessive stormwater accumulation.

Compost on Pad 1 was observed to have begun regular turning cycles during the June 2021 inspection, with further monitoring of key parameters proposed and requested to be communicated to the Council. This was achieved in September 2021. However, the continued adherence to undertaking this in the correct conditions is required, as per recommendations from the suitably qualified consultant.

An aerator was deployed to the final irrigation pond associated with the DMP/Pad 3. The aim of this device was to maintain the dissolved oxygen content within the irrigation pond. The aerator is manually operated for a certain number of hours a day. This practice, of operating the periods of use of the aerator manually, may not adequately maintain the desired dissolved oxygen concentration within the pond at all times.

This device is specifically aimed at negating offensive odour generation, as noted in the air section and investigation sections of this report. It was a recommendation provided by a suitably qualified environmental consultant. The Company are in the process of looking at options to operate this device autonomously.

Discharges to land

In terms of discharges to land, the Company's irrigation records showed that 17,775 m³ was irrigated to 13.18 ha during this monitoring period. The Council estimated that 7,696 kg of nitrogen was discharged to land however, this was unevenly applied across the discharge area, with a number of irrigation areas (6 of 8) subjected to elevated nitrogen (>500 kg N/ha). One area in particular (L1) was subjected to a significantly elevated concentration of nitrogen application (>800 kg N/ha).

In comparison to the previous monitoring period, reductions in nitrogen application were apparent (areas U3 and L1 >1,000 kg N/ha 19-20 monitoring period). However, the concentrations irrigated to land in this current monitoring period are considered to be high and further work is required by the Company to make sure appropriate nitrogen loading rates are applied to land. This would be closer to 300-400 kg N/ha, in line with other consents for cut and carry irrigation in the region.

Nitrogen loading should be undertaken in a way which reduces the risk of leaching of excessive nitrogen from the system. This can lead to elevated concentrations in water courses, which can adversely affect the freshwater environment, both directly from a toxicological perspective (acute to chronic) or indirectly from a biological perspective (eutrophication and algal blooms).

The irrigation method was modified in January 2021 to bring into service low application sprinklers. These discharged less fluid than the previous system (reduction from 30 m³ per hour to 20 m³ per hour). However, greater care needs to be undertaken by the Company especially during the winter months when irrigation areas are saturated. Alternative techniques, such as deficit irrigation would improve transparency around irrigation application, and help reduce the risk of any overland flow or leaching associated with over-irrigation.

Overall from a performance perspective, the Company has been poor this monitoring period. While site improvements continue to be made, the Company needs to make sure it is proactive in approaching Council prior to accepting any materials that are at risk of breaching consent conditions, and in notifying Council if such incidents occur. Treated sawdust, waste oil and cement, have no place in composting, and cannot be accepted on site.

Performance for discharge to air consent 5938-2

In total, 83 complaints were received by the Council in regard to the discharge of offensive odour from the site, beyond the boundary. Five did result in the finding of proven objectionable odour. These related to the irrigation pond and the composting windrows as sources.

The Council requested the Company to engage expert opinion to mitigate their impacts to the air. A suitably qualified consultant was engaged and by December 2020, a report was received by the Company. This contained recommendations as to what undertakings were required to mitigate offensive odour generation.

These recommendations have yet to be actioned in full by November 2021, a year since the Council requested mitigation to occur.

Material acceptance has already been discussed in 5838-2.2 and will not be further discussed here.

[Performance for twin culverts consent 5938-2](#)

The twin culverts performed well during this monitoring period. Inspections noted on one occasion a requirement for additional downstream rocks to lift the static water level. This was mitigated by the Company and noted in subsequent inspections. No other issues were reported during inspections.

[Performance for stream realignment consent 6211-2](#)

No performance issues were noted in relation to the stream realignment this monitoring period. Minimal issues have been noted with this consent in recent years. The consent will not be renewed moving forward, as it expired in June 2021. There is no requirement to renew it.

[Performance for single culvert in the Haehanga Stream consent 6212-1](#)

This culvert appeared stable with no headwall erosion noted throughout the course of the monitoring period. Fish passage has been an off and on issue since the formation of this culvert in 2007. The requirement for additional fish passage mitigation has been regarded by the inspector throughout this monitoring period.

Works were undertaken on this culvert by the Company (February 2021). Satisfying fish passage across all flows has proved difficult, this is particularly evident during summer low flows when the flow in the Haehanga Stream is very low, to no flow at times.

The works which were undertaken this period were communicated to have worked by the inspector, however further work is required to maintain this throughout the year. With the primary issue being the summer low flow.

[Performance of the large culvert situated in the unnamed tributary of the Haehanga Stream consent 10547-1](#)

No performance related issues were conveyed by the inspector in relation to this culvert during the recent monitoring period.

[Performance to discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream consent 10063-1](#)

The quarry was not utilised by the Company for the entirety of the monitoring period. The cut off drains remained in functional order by diverting stormwater from the access track. With the area naturally revegetating throughout the monitoring period.

During the November 2020 inspection it was suggested that the lower bund (on the access track) be reshaped again, and compacted to no less than 400 mm. Cut off drains and bunding remained in place for the duration of the monitoring period.

It was also communicated that if the quarry was to become operational again, it would require discussion with the Council about additional stormwater control measures. No other performance related issues were noted during the monitoring period.

[Performance of the realignment of two unnamed tributaries of the Haehanga Stream for land improvement purposes consent 10825-1](#)

This consent was brought on line in this monitoring period. The Company proposed to develop an additional land disposal area (area L6) in close locality to the main gate. In doing so, two ephemeral

tributaries of the Haehanga Stream were realigned along the southern edge of the new irrigation area (Figure 5).

As part of the consent, there was a requirement for a fish rescue and recovery plan. This was submitted and certified by the Council's biologist. During the works, the flow in the tributaries were low, to no discernible flow, as such minimal to nil fish were required to be recovered.

No slippages or natural erosion of the realignment section was noted during inspections. These will continue to be monitored for in the upcoming monitoring period. Slips had been noted in other areas of the site and had been communicated via inspections.

[Performance of the modification of an existing culvert to provide for fish passage into an unnamed tributary of the Haehanga Stream consent 10843-1](#)

The culvert which was replaced by this consent had been in situ for a prolonged period of time. Communicated by the consent holder was that the culvert was present in the unnamed tributary prior to them acquiring the site. It was significantly perched, as such, with the proposed development of the lower irrigation area, the pre-existing culvert required significant works to enable fish passage.

The new culvert was installed in the 20-21 monitoring period, and will require some time to settle. Recent inspections notices from the 21-22 monitoring period noted that some headwall erosion had occurred through a recent rainfall event. This was fixed by the Company in a proactive manner. Currently, the new culvert appears fit for purpose and is an improvement from the previous, unconsented culvert which it replaced. Performance will continue to be measured over time.

3.2 Environmental effects of exercise of consents

Environmental effects will be discussed by consent.

[Environmental effects associated with the discharge to land consent 5838-2.2](#)

The wetland treatment system (WTS) discharge was found compliant with condition 24 (pH and suspended solids) on all six occasions monitored. Significant total ammoniacal nitrogen was recorded ($>10 \text{ g/m}^3$) on five of six occasions. Associated with the total ammoniacal nitrogen was an elevated concentration of un-ionised ammonia ($>0.025 \text{ g/m}^3$) on all six occasions.

Foaming of surface waters had been observed in both the Haehanga Stream, as well as the associated unnamed tributary from the WTS. A sample from the discharge was found to contain a surfactant, identified through methyl blue activated substance testing. The occurrence of foaming in surface water can be a natural occurrence. It is produced when organic matter decomposes and releases fatty acids that act as surfactants or surface active agents²⁰. Measurable to elevated *E. coli* was also recorded on three occasions in this discharge.

Associated surface water compliance testing of the WTS discharge, post mixing zone at HHG000103, found the concentration of un-ionised ammonia on the consent limit, condition 25 (0.025 g/m^3), on one occasion. The corresponding dissolved carbonaceous biochemical oxygen demand was below the consent limit (≤ 2.0) on all occasions.

Total ammoniacal nitrogen was measurable at this compliance point within all samples collected. pH 8 adjusted (for equivalent toxicity) total ammoniacal nitrogen results (as required by the NPS-FM, but not by the consent) recorded four of seven monitoring rounds with a concentration greater than the national bottom line, annual maximum ($>0.4 \text{ g/m}^3$). On three occasions of the four, the concentration was within attribute state C, and on one occasion, at attribute state D, as defined by the policy statement. These acute

²⁰ Foam on surface waterbodies, Ministry for Environment, Environmental Protection, Thompson Region, British Columbia

impacts are deemed to have the potential to significantly affect the instream biology, especially for sensitive species, as defined by the policy statement.

The median adjusted total ammoniacal nitrogen was calculated from 24 samples, across three years (October 2018- October 2021). The median (0.309 g/m^3) indicated, that over the long term, the monitoring site was marginally above the bottom line, in attribute state C. This is 80% species protection. At this concentration it starts impacting regularly on the 20% most sensitive species (reduced survival of most sensitive species).

Overall, direct wastewater discharges to surface water are being phased out in this region and whether the WTS can remain in its current form will be determined during the on-going consent renewal. Currently the WTS serves as a consistent source of elevated ammoniacal nitrogen to surface water, which exceeds the NPS-FM national bottom line (annual maximum and median) for the majority of the time it is assessed at the compliance point, HHG000103.

Surface water monitoring of the Haehanga Stream indicated that nitrogen impacts, in the form total ammoniacal nitrogen, were of the greatest concern to the water course. Eight of nine²¹ surface water monitoring rounds indicated elevated ammoniacal nitrogen (in excess of the NPS-FM national bottom line annual maximum). On most occasions the exceedances were at multiple sites, and generally increased in concentration down the catchment.

There are two forms of nitrogen concentrations which have occurred on the Haehanga Stream and associated tributaries this monitoring period. These are associated with acute and chronic impacts, as defined by the NPS-FM. Chronic impacts are associated with long term, measurable ($\geq 0.24 \text{ g/m}^3$) concentrations of ammoniacal nitrogen, as demonstrated by the median concentration of ammoniacal nitrogen at HHG000103 (below the WTS), which falls within NPS-FM attribute Band C. These impacts have been recorded below the lower monitoring sites of the Haehanga Stream, as reported in the August, October, December 2020 and February, July 2021 surface water monitoring rounds.

The concentrations recorded in those rounds were in breach of the national bottom line annual maximum. In terms of compliance with the consent. Part g) of condition 25, on consent 5838-2.2, states that the discharge shall not have any significant adverse effect on aquatic life. An exceedance of the national bottom line as defined by NPS-FM-FM, is deemed by the NPS-FM to mean 20% of the most sensitive species within a water course are impacted regularly. The biological monitoring of the Haehanga Stream (Section 2.1.8) concluded with:

‘MCI declines significantly downstream of consented activities such as the wetland treatment system discharge as well as the irrigation areas.’

This biomonitoring demonstrates that the facility was in breach of consent 5838-2.2, through significant adverse effects to instream biota.

Part i) of condition 11, consent 5838-2.2 states; 30 m below the irrigation areas there should be no significant adverse effect on aquatic life. HHG000168 is the compliance point, 30 m downstream from the irrigation areas. The biologist’s survey determined significant adverse ecological effects at the biomonitoring sites either side of this water quality site.

To a lesser degree, similar exceedances of the NPS-FM were also recorded at sites HHG106, 115, 160 and 190. While these sites do not have specific conditions stipulating the analytical requirements per site, condition 1 of consent 5838-2.2, states that the best practicable option to minimise or prevent adverse effects on the environment should be implemented. Again, noting the biologist’s comments the Company

²¹ Six planned compliance surface water monitoring rounds, one smaller follow up round, and two after hours incident monitoring rounds were completed on the Haehanga Stream and associated unnamed tributaries

could be considered to be in breach of this condition on four occasions of the seven, acute impacts are demonstrated by the two incident surface water monitoring rounds (25/26 June 2021).

The corresponding nitrogen impacts were, in comparison to the chronic impacts, of a greater concentration. It should also be noted, that in the case of the 26 June 2021, the Mimitangiatua River was affected by this incident. The corresponding total ammoniacal nitrogen was recorded above the national bottom line, annual maximum, below the confluence of the Haehanga Stream. This is a potential offsite effect from the exercise of the consent.

The cause in that instance was the over irrigation of fluid to the lower irrigation area L1. Noting that L1 had already received in excess of 800 KG N/ Ha in the monitoring period, it demonstrates a lack of control exercised by the consent holder, as to not paying regard to ground conditions when irrigating and over irrigating.

The context of the nitrogen impacts to the Haehanga Stream are clearly demonstrated in the following Figure 34. This figure contains surface water data since 2019. Of note are the baseline ammoniacal nitrogen results, defined by sites HHG00090, 97 and 165. These are unaffected by the site operations. In the case of HHG000165, this is from the new lower irrigation area, L6. This has yet to be utilised for irrigation. If current site practices continue it would be expected that the downstream sites (HHG000168 and HHG000190) and the Mimitangiatua River would be further impacted by an increase in ammoniacal nitrogen from the utilisation of L6.

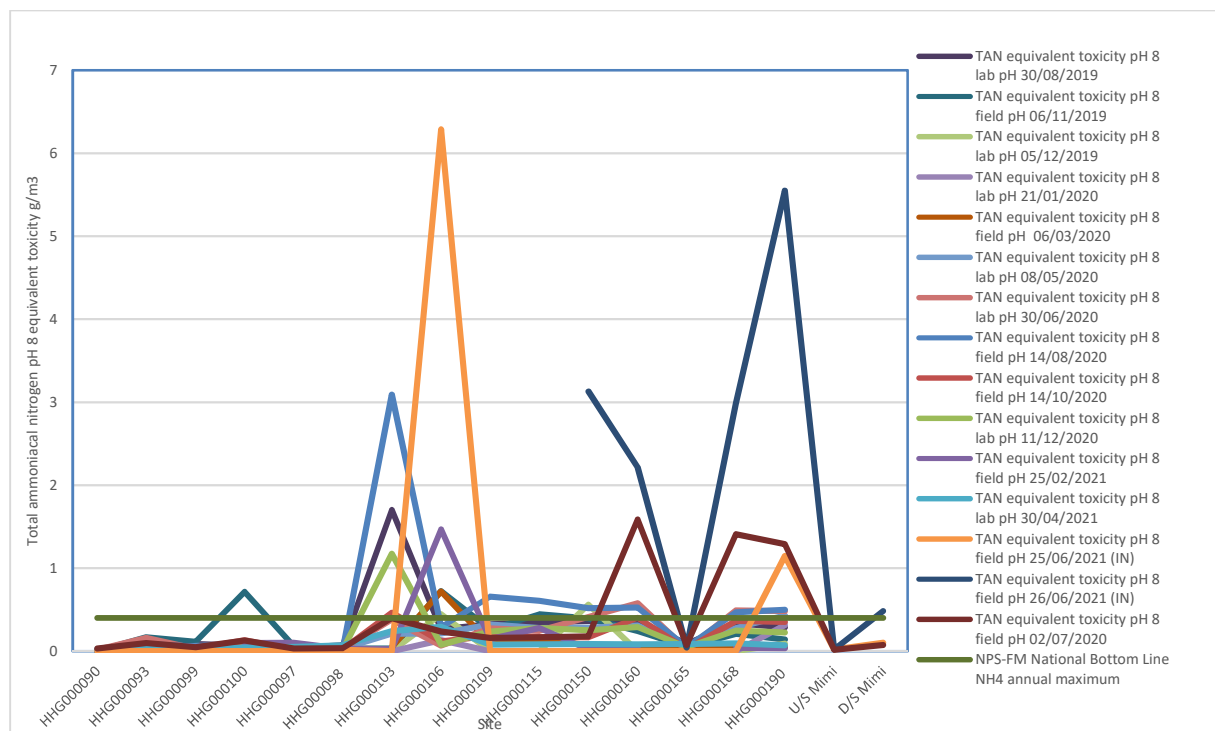


Figure 34 Total ammoniacal nitrogen (at pH 8 for equivalent toxicity, with lab or field pH) water monitoring Haehanga Stream 19-21

E. coli monitoring of surface waters indicated that the facility is increasing the concentration of *E. coli* within the Haehanga Stream. The influence of the site operations resulted in an order of magnitude increase in *E. coli* concentration between top and bottom monitoring sites within the catchment. Some mid-stream monitoring sites had recorded an increase of two orders of magnitude for this analyte.

Biological monitoring of the Haehanga Stream and associated unnamed tributaries was undertaken on one occasion (19 January 2021). This year marked the first instance a new reference site was identified and

utilised for comparison purposes with the Haehanga Stream data. This location was agreed between the Council and Ngati Mutunga's freshwater expert.

The conclusions of the Council's biologist were as follows:

Overall, macroinvertebrate community health in the Haehanga has improved compared to the previous survey; however, MCI declines significantly downstream of consented activities such as the wetland treatment system discharge as well as the irrigation areas.

Additionally, affected sites (T3, 2, 5, 6, and 7) exhibit lower macroinvertebrate community health scores than what was recorded at a reference site in a similar catchment in the area: significantly lower at the two most downstream sites (6 and 7).

This suggests that the wetland treatment system discharge, storm water run-off, or potential leachate run off / through flow from the irrigation areas into the Haehanga stream are likely contributing to the decline in macroinvertebrate health.

Noting the statement in the final paragraph of the biologist aligns with the ammoniacal nitrogen data which has been described in the surface water monitoring discussion above. Concentrations of such elevation (acute and chronic) could affect sensitive species.

Treated sawdust had been utilised (unconsented) by the Company for composting drilling mud for an estimated 15 years. The Council initially tested the irrigation fluid associated with the drilling mud Pad 3 (April 2021) and found trace concentrations of tebuconazole and propiconazole. Two fungicides which are utilised in the wood preservative industry. Groundwater was then assessed, a trace detection of tebuconazole was recorded in the May 2021 monitoring round, in one monitoring well (GND2188). Sawdust samples were collected from two locations on the site, the large sawdust pile, located at the end of the greenwaste composting Pad 1, as well as from the drilling mud pad.

The sawdust analysis (of which there were three samples) indicated that the material held on the greenwaste pad 1 was a mixture of treated sawdust types. Leaching tests indicated permethrin, tebuconazole and propiconazole. Three compounds that are utilised in light organic solvent preservative (LOSP) wood treatments. Copper, chromium and arsenic (CCA) were also detected at lower concentration in both greenwaste Pad 1 samples. These leaching results were also backed up by specific CCA testing, undertaken at Scion. This quantified that one of the two samples from the greenwaste Pad 1 sawdust pile was CCA treated, the second was just below the laboratory limit of detection.

Surface water incident monitoring (25/26 August 2021), as well as the final surface water monitoring round of the year (2 July 2021) recorded trace concentrations of tebuconazole and propiconazole (Section 2.1.3). In the case of propiconazole at site, the concentration recorded was equal to or greater than the Environmental Exposure Limit²² ($>0.0001 \text{ g/m}^3$ EEL) as defined by the NZ Environmental Protection Agency. However, below the 99% species protection limit²³ set by the Queensland Government (0.0037 g/m^3).

²² The EPA has set maximum environmental exposure limits to define a maximum level of herbicide which must not exceeded in order to protect environmental health

²³ Table 46 O. C. King, R. A. Smith, M. St. J. Warne, J. S. Frangos and R. M. Mann. 2017. Proposed aquatic ecosystem protection guideline values for pesticides commonly used in the Great Barrier Reef catchment area: Part 2 - Bromacil, Chlorothalonil, Fipronil, Fluometuron, Fluroxypyr, Haloxypop, MCPA, Pendimethalin, Prometryn, Propazine, Propiconazole, Terbutryn, Triclopyr and Terbutylazine. Department of Science, Information Technology and Innovation. Brisbane, Queensland, Australia. August 2017

While there were no significant concentrations of these two pesticides detected in the surface waters, they should not be discharged into surface waters. In the case of tebuconazole, this is an endocrine disrupting chemical and recent research suggests it may have a function in the proliferation of cyanobacteria, by suppressing fungal pathogens that may otherwise control their growth²⁴. It is also noted that the concentrations of tebuconazole recorded during the monitoring period were lower than the recent research suggests. However the potential remains.

Propiconazole is currently under assessment for endocrine disrupting properties by the European Chemicals Agency (ECHA). The compound can adversely affect fertility and unborn children. It is very toxic to aquatic life, with long lasting effects²⁵.

Considering the instream communities are already stressed through nitrogen impacts, the combination of trace concentrations of fungicides over the same time period, would add further pressure.

Samples of the drilling mud pile collected by the Council, and by a suitably qualified environmental consultant demonstrate that the DMP remains a source of these chemicals on site. The other main source of these compounds are the baled treated sawdust pile which remains on the site. It is not known whether these may leach over time. Best practice is for this material (baled treated sawdust) to be double bagged and then sent offsite to appropriately designed and operated landfill, capable of dealing with such material.

Groundwater monitoring

No significant petroleum hydrocarbons were detected in any of the wells this monitoring period. Trace detections of TPH C7-C9 (GND2188) and toluene (GND2188 and 3010) were one time occurrences.

Groundwater monitoring impacts were short term (<3 months) in most monitoring wells on site. While short term, they could also be high impact. This was demonstrated with a one off concentration of 53 g/m³ of nitrate/ nitrite nitrogen in GND3008 (August 2020).

GND2190, conversely, which is located in one of the older irrigation area, remained elevated for chloride (900 g/m³ +/-). This is at a concentration requiring action from the consent holder, as defined by the facility management plan.

GND3007 is located at the site entrance. All analytes remained of low concentrations, however, there were minor increases across electrical conductivity and ammoniacal nitrogen monitoring. It may be too early in the data set to draw any conclusion from these minor increases.

A trace concentration of tebuconazole was also recorded in GND2188 (May 2021). Discussions are currently ongoing around the deployment of passive monitoring samplers for inclusion to the groundwater network, in order to understand the mass loading of LOSP treatment chemicals to groundwater over time.

Soil monitoring

Shallow and deep composite core samples were collected from all irrigation areas this monitoring period.

²⁴ Ortiz-Canavate, Wolinska, Agha. 2019. Fungicides at environmentally relevant concentrations can promote the proliferation of toxic bloom-forming cyanobacteria by inhibiting natural fungal parasite epidemics, *Chemosphere* Volume 229, Pages 18-21 August 2019

²⁵ <https://echa.europa.eu/brief-profile/-/briefprofile/100.056.441>

Soil chloride concentrations in irrigation areas had been on the watch list. In certain areas (L1-3) the concentrations have been found elevated in previous monitoring periods (2018-2020). The monitoring in this period demonstrated a reduction in soil chloride concentrations across these previously elevated areas.

In terms of heavy metal analysis within the irrigation areas, all areas compared to median or 95% percentile concentrations for these heavy metals²⁶ given in regional or national databases. However, when compared to baseline analysis from pre-development irrigation areas, the concentrations were slightly elevated in some cases.

Barium concentrations ranged considerably this monitoring period. Background concentrations were determined by area L4 2019 baseline (36-36 mg/kg) and L5 2020, 2021 (67-72 mg/kg). Conversely, the newly constructed irrigation area, sample L6 shallow, held the most elevated concentration for barium in the data set (2,300 mg/kg). This suggests that drilling mud had been utilised by the Company (unconsented) for the development of this area²⁷.

Areas U1 (2,200 mg/kg) and L1 shallow (1,940 mg/kg) held the next elevated concentrations in the current monitoring period data set. Area U1 is a long term irrigation area, while in the case of L1, drilling mud was utilised (unconsented) in its creation. Area L1 also received the highest nitrogen loading per hectare this monitoring period. This would account for the concentrations recorded.

No LOSP treatment chemicals (permethrin, tebuconazole and propiconazole) were detected in any of the irrigation area soil samples this monitoring period. These compounds were detected in the spot samples collected from the drilling mud pad (Section 2.1.7). They have also been recorded (by suitably qualified consultant) at a greater concentration in the middle of the drilling mud pad 3.

These results suggest the practice of accepting and using treated sawdust may have extended the life of the consent. This also includes CCA treated sawdust, as referenced by the heavy metal results recorded in the spot samples.

To conclude on environmental effects for 5838-2.2.

- The WTS introduced a sustained concentration of total ammoniacal nitrogen to the Haehanga Stream for the majority of the monitoring period. Concentrations at HHG000103 shows that this site fails to achieve both NPS-FM annual maximum and median bottom lines.
- Surface water monitoring indicated an increasing trend in ammoniacal nitrogen concentration (in excess of the NPS-FM bottom line, annual maximum). This is observed within the unnamed tributary of the Haehanga, as referenced by the WTS monitoring, but also below site irrigation areas. Where a combination of the WTS discharge and over irrigation of the irrigation area is occurring. This has been shown to affect the much larger Mimitangiatua River, with one incident demonstrating that elevated ammoniacal nitrogen within the Haehanga Stream can and is influencing the Mimitangiatua River. This is an offsite effect on water quality from the exercise of this consent.
- *E. coli* monitoring demonstrates the exercise of this consent is increasing the concentration within the Haehanga Stream.
- Estimated loading of irrigation areas noted some significant discharges of nitrogen to land (>500 kg N/ ha).

²⁶ Report entitled "Background soil concentrations of selected trace elements and organic contaminants in New Zealand" (Envirolink Tools Grant: C09X1402) Landcare research limited and Maps of total soil concentrations (background levels) of chromium, copper, lead, nickel, vanadium and zinc in the Taranaki Region. LCO102/152.

²⁷ An investigation was initiated and enforcement is currently being considered at this time. A follow up soil sample was collected in the 2021-2022 monitoring period and this reconfirmed the initial soil result for barium in area L6.

- Literature and the government's NPS-FM suggest that the concentrations recorded for ammoniacal nitrogen within the Haehanga Stream and associated unnamed tributaries would have an adverse effect on the instream biota. This is consistent with the results of the annual biomonitoring survey.
- The unauthorised acceptance and utilisation, through composting, of treated sawdust, has resulted in trace concentrations of LOSP treatment chemicals within the irrigation fluid, groundwater (one well) and surface water (multiple occasions).
- In addition, spot samples of the drilling mud (RNZ 1-4) indicate that this practice may have been ongoing for 15 years, unconsented. Thus the concentrations recorded in this monitoring period may not provide the worst case scenario for these compounds. These may have been of a greater concentration and consequence in previous monitoring periods. It is noted that in earlier monitoring periods leachate break out was recorded from the drilling mud pad and sawdust was found, discharged into an unnamed tributary of the Haehanga Stream.
- The spot samples from the drilling mud pad contained elevated barium, sodium, LOSP chemicals and measurable total petroleum hydrocarbons. Certain heavy metals are also elevated when compared to baseline site soil concentrations.
- Groundwater monitoring indicates short term impacts. Chloride impacts are still evident in GND2190.
- Soil monitoring has determined that the new lower irrigation area is partially constructed from material of drilling mud origin.
- Soil chloride results are decreasing.

Environment effects associated with the discharge to air consent 5839-2

This consent drew a number of complaints, as previously discussed. Of those complaints, on five occasions, offensive odour was observed by inspectors and appropriate enforcement was undertaken (Section 2.3).

Three separate air monitoring surveys were undertaken throughout the monitoring period, to assess for target analytes within the air at the Uruti site. The results of these were communicated in Section 2.2.

The outcome from the initial MultiRae PID survey, in conjunction with complainant's comments from a pre-hearing meeting, and field officer observations, prompted the Council to request the Company mitigate the odours. It was suggested to engage a third party, suitably qualified consultant.

This was undertaken with the following five recommendations provided by the consultant, via a report, in December 2020:

1. Desludging of the leachate ponds and aerating the ponds to increase the dissolved oxygen concentration above 1mg/ml.

Ponds were subsequently desludged, with number of them filled in. This procedure was not completed until after the end of the monitoring period, 8 months after the report was issued.

Two aerators have been purchased by the Company and are now in operation. The larger of the two is located in the irrigation pond, while the second is located in the truck wash and Pad runoff pond upstream of the irrigation pond. Both these devices are manually operated, and as such they may not function at all times. Plans are in place with the Company to automate these devices, as to turn on when the dissolved oxygen drops below the prescribed concentration.

As of November 2021, the Company have acquired a dissolved oxygen probe, which will measure the dissolved oxygen concentration within the irrigation pond continuously. In the meantime the Company have been assessing the dissolved oxygen concentration manually, by hand held meter. This commenced 1 September 2021.

2. Composting the material on the greenwaste Pad 1 in windrows, and regularly monitoring the temperature and moisture content of the compost and turning the windrows to make sure that composting is undertaken in aerobic conditions.

The regular monitoring of compost for oxygen and temperature, as required by the New Zealand standard (4454:2005), commenced in April 2021²⁸. The Company has since provided records to the Council that this was being undertaken.

3. Avoid undertaking odour causing activities such as leachate irrigation, compost turning and raking of vermiculture material when winds are coming from the southeast and less than 3 m/s.

Leachate irrigation occurs independent of wind direction, though the Company do attempt to undertake compost turning in northerly wind condition.

4. Continue to use the tanker for irrigating the northern irrigation fields.

Council officers have observed irrigators in use in the northern irrigation areas. These were responsible for the surface water incidents recorded 25/26 June 2021.

5. Use odour suppressant within the cold air drainage bunds to help minimise odours dispersed during katabatic flows.

This is being regularly undertaken by the Company.

To conclude on environmental effects for the air discharge consent 5839-2

- Impacts to air, in the form of offensive odour, beyond the site boundary, have occurred this monitoring period. The Company were given clear advice to mitigate this issue. However, 11 months to partially implement these recommendations, while odour complaints continue, is a considerable period of time.
- This does not represent best practice, as the causes and solutions of odour generation are known. While progress is occurring in this area, continued adherence to maintaining control of odour sources, so they do not create objectionable odour beyond the boundary is required.
- As a side note, since 1 July 2021 and the end of the period covered in this report, the Council has received 30 complaints from the public in relation to odour. No objectionable odour has since been observed by inspectors following up on said complaints. On the other hand, the recommendations have not been fully implemented as at the time of preparation of this report.

[Environmental effects for the use of twin culverts 5938-2](#)

No environmental effects were noted during inspections. On one occasion there was potential that the fish passage may have been slightly impeded, as drop in static water was noted mid culvert, noting this was one side of the twin culvert.

The Company were informed of this slight drop and actions were taken to mitigate. No other issues were reported and fish passage was maintained for the duration of the monitoring period.

[Environmental effects for the stream realignment consent 6211-1](#)

Minimal environmental effects were recorded in relation to the stream realignment this monitoring period. Banks appeared stable and the stream free flowing through the realignment. The banks are well vegetated with grass, however riparian vegetation is somewhat lacking in this area, with it due to be planted in due course. No issues with fish passage other than summer low flows.

²⁸ Communicated through current consent renewal mediation

[Environmental effects of instream culvert on the Haehanga Stream consent 6212-1](#)

The large single culvert on the Haehanga Stream was found to be free from blockages with solid banks and no head wall erosion throughout the monitoring period. Fish passage has been provided for the majority of the monitoring period. The summer low flows have been an area of difficulty for the Company. Being able to satisfy fish passage, when there is no discernible flow has proved challenging.

The Company did undertake works on this culvert, as referenced by the February 2021 inspection notice. The inspector regarded the works as reasonably successful, at the time. However, further works were required, and this was reinforced during the April 2021 inspection. By the end of the monitoring period, the Company had attempted again to improve the flow aspect of the culvert. The Council inspector stated the works had removed a fast flowing aspect of the water discharging over a hard rock. Some further work may be required to tweak this aspect. The Council's biologist would be consulted on this aspect moving forward.

[Environmental effects of the large culvert situated in the unnamed tributary of the Haehanga Stream consent 10547-1](#)

Minimal environmental effects were noted in relation to this culvert. As stated in previous annual reports. Fish passage has not been assessed due to the culvert being very long and dark, constituting a confined space. It leads from a rocky gully through to the Haehanga Stream. The headwall has been found to be stable throughout the monitoring period.

[Environmental effects in relation to the discharge of treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream consent 10063-1](#)

Minimal environmental effects were noted for this consent in this monitoring period. This is likely attributed to the non-operational nature of this consent in this monitoring period. Suspended solid concentrations remained at low concentration in the Haehanga Stream, with the only elevated suspended solids noted in the unnamed tributary, up gradient from the WTS, which is on the other side of the site, than the quarry, and is therefore unrelated. Inspections noted the cause of the suspended solids increase (up gradient from the WTS) was attributed to a slip in the native bush area and was not influenced by site operations.

[Environmental effects associated with the realignment of two unnamed tributaries of the Haehanga Stream for land improvement purposes consent 10825-1](#)

Barring the actual development, the overall environmental effects associated with the operation of this consent are minimal. The land disturbed by the earthworks has stabilised, with the batters beginning to grow grass on the exposed areas. Continual monitoring for any channel slippage is required. As this could cause a diversion of stormwater from around the irrigation area, to across it.

Riparian planting has been undertaken on the realignment, though the true left bank requires planting and this is planned to be undertaken by the Company. Stock are still able to access the realignment from the true left bank. A fence is proposed to be temporarily erected to negate the stock access. With stock proposed to be removed from this area in due course.

[Environmental effects associated with the modification of an existing culvert to provide for fish passage into an unnamed tributary of the Haehanga Stream consent 10843-1](#)

The environmental effects of the modification of the pre-existing culvert have been an overall positive effect. As previously discussed, this culvert was considerably perched, which negated fish passage from achieving upstream movement. This has now been replaced with a fit for purpose culvert which allows for fish passage. Rock rip rap has been installed on either side and through the culvert, to enable climbing species access. The Company have been requested to keep an eye on the development, as it settles in place.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 34-45.

Table 41 Summary of performance for consent 5838-2.2

Purpose 5838-2.2: <i>To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practical option	Programme management/site inspections	<ul style="list-style-type: none"> - No - Acceptance of unauthorised material on multiple occasions <ul style="list-style-type: none"> i. Waste oil ii. Cement returns iii. Light organic solvent preserved (LOSP) sawdust iv. Copper, chromium arsenic (CCA) sawdust - Falsification of records pertaining to waste oil acceptance - Not following the site management plan by utilising treated sawdust for the life of this consent - Soil analysis suggests drilling mud compost has been utilised in the creation of new irrigation are L6 due to elevated barium, copper and calcium - Over irrigation of paddock led to overland flow and elevated contaminants within the surface water on two occasions - Excessive nitrogen discharged to irrigation areas - LOSP treatment chemicals detected in surface water samples - LOSP treatment chemical (tebuconazole) detected in groundwater on one occasion - NPS-FM annual maximum exceedances for ammonia in surface water at multiple sites
2. Only acceptable waste accepted onto site	Site inspections/review of supplied records	<ul style="list-style-type: none"> - No - The review indicated some wastes accepted without authorisation. - Infringement fine issued

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Representative sample of each type of drilling waste analysed for: a. Total petroleum hydrocarbons b. Benzene, toluene, ethylbenzene and xylenes c. Polycyclic aromatic hydrocarbons d. Heavy metals e. Chloride, nitrogen, pH, potassium and sodium	Records to be provided	<ul style="list-style-type: none"> - Yes - Analysis provided by Company - Drilling wastes ceased acceptance 31 December 2020
4. DAF residue not to be accepted	Site inspections/review of supplied records not listed as accepted	<ul style="list-style-type: none"> - Yes - Records checked
5. Maintenance of stormwater systems	Inspections	<ul style="list-style-type: none"> - Maintenance ongoing - Specific requirement to manage leachate on Pad 3 drilling mud pad
6. Maintenance of treatment systems	Inspections	<ul style="list-style-type: none"> - Yes - Maintenance on going
7. Adequate pond construction to prevent any leak to surface water or groundwater from any leachate or stormwater holding pond	Inspections and monitoring	<ul style="list-style-type: none"> - Yes - No significant supporting surface water contamination to suggest a leak from current Pad 3
8. Keep and supply irrigation records	Supply of records	<ul style="list-style-type: none"> - Yes for the irrigation pond - Supplied in operating hours per area - No conductivity monitoring supplied - No wetland discharge information provided
9. No direct discharges to water to occur as a result of irrigation to land	Site inspections /sampling	<ul style="list-style-type: none"> - No - Over irrigation of lower irrigation area L1 led to overland flow and direct discharge to surface water
10. Irrigated fluids not to exceed 5% hydrocarbon content or SAR of 18	Site inspections and sampling	<ul style="list-style-type: none"> - Yes - Sampling indicated the SAR was below the value of 18 on all monitored occasions - TPH in fluid has been below 5%

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Discharges not to cause adverse effects at downstream of irrigation areas	Surface water sampling and inspections	<ul style="list-style-type: none"> - No - The biological monitoring of the Haehanga Stream suggests significant adverse effects below the irrigation areas - On one occasion the concentration of un-ionised ammonia was above the consent limit ($>0.025 \text{ g/m}^3$) at HHG000168 - Four of nine surface water monitoring rounds (HHG000168) identified elevated ammoniacal nitrogen at concentrations above the NPS-FM bottom line ($>0.4 \text{ g/m}^3$ pH 8 adjusted for equivalent toxicity), which are deemed in the NPS-FM to have potential for adverse effects
12. Soil sampling to be undertaken for TPH and BTEX	Soil sampling undertaken by the Council	<ul style="list-style-type: none"> - Yes
13. Soil sampling to be undertaken for chloride, sodium, magnesium, calcium, potassium, soluble salts and conductivity	Soil sampling undertaken by the Council	<ul style="list-style-type: none"> - Yes

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
14. Adhere to composting facility management plan	Inspections	<ul style="list-style-type: none"> - Bird scare deployed - Goat culling undertaken - Pig trapping - Significant seagulls, thus continued adherence to removing this vector from site is required - Irrigation areas extended significantly - Stormwater improved - Setbacks from Haehanga undertaken - Storage dam not completed - It is noted the dam was proposed in 2015, the NPS-FM 2020 requires adherence to regarding and maintaining fish passage. The proposed dam does not currently have provision for fish passage, this aspect will require careful consideration if it is to go ahead - Monitoring within the tiered system as defined by plan needs to be adhered to as the chloride in GND2190 is at Tier 2. - More riparian planting required (deferred fish survey to allow time to plant additional and develop riparian margin across the whole site)
15. Establish groundwater monitoring bores	Site inspections	<ul style="list-style-type: none"> - Yes - Additional monitoring wells have been installed
16. Groundwater monitoring wells installed as per standard	Undertaken	<ul style="list-style-type: none"> - Yes
17. Consent holder monitoring and record groundwater in each monitoring well each day for level, temperature, and conductivity	Not undertaken by consent holder	<ul style="list-style-type: none"> - No - Not undertaken every three months or supplied as required by consent - Consent holder intends to comply with this in the 21-22 monitoring period
18. Groundwater sampled per six month interval: a. Total petroleum hydrocarbons b. BTEX	Undertaken by Council	<ul style="list-style-type: none"> - Yes

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
19. Groundwater samples shall be collected from all wells for chloride, sodium, magnesium, calcium, TDS and conductivity	Undertaken by Council	- Yes
20. Prepare Pond Treatment System Management Plan	Plan provided	<ul style="list-style-type: none"> - Yes - Management plan now termed leachate and stormwater management plan currently included in consent renewal - Original Pond Treatment System management plan issue date July 2010 issue 1 currently utilised
21. Adhere to Pond Treatment System Management Plan	Inspections	<ul style="list-style-type: none"> - No - Storage pits and ponds not regularly cleaned out as defined by plan - Conductivity of the irrigation pond not measured
22. Prepare Wetland Treatment System Management Plan	Management plan (Wetland Treatment Management Plan) submitted for consent renewal	- Yes 27-09-2018 updated
23. Adhere to Wetland Treatment System Management Plan	Inspections	<ul style="list-style-type: none"> - For the most part - However, it is doubted whether deceased bulrushes (raupō) have been replaced in the WTS
24. Wetland discharge not to exceed certain parameters	Sampling	- Yes
25. Wetland discharge not to cause certain effects at site HHG000103	Sampling	<ul style="list-style-type: none"> - No - Un-ionised ammonia on the limit on one occasion - Biological monitoring suggests significant adverse effects caused by this discharge - Not consent matters, but to note: Concentration of total ammoniacal nitrogen exceeded the NPS-FM national bottom line on four of seven occasions (annual maximum) Median concentration of ammoniacal nitrogen in excess of NPS-FM national bottom line

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
26. Maintain riparian plantings	Inspection identified that riparian planting is developing. This will be on-going	<ul style="list-style-type: none"> - Additional riparian planting undertaken - A significant portion still requires planting. The Council biologist requires significantly more planting of the stream margin. - The annual fish survey has been postponed for three year to allow the Company to further develop the riparian margins to enhance the habitat for biology and create better shading
27. Notify the Council of significant incidents on site	No notifications received	- N/A
28. Prepare a Site Exit Plan prior to site closure	Not supplied	- Not supplied as yet
29. Adhere to Site Exit Plan	N/A	- N/A
30. Optional Review	Consent renewal occurring	- N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Poor
Overall assessment of administrative performance in respect of this consent		Poor

Table 42 Summary of performance for consent 5839-2

Purpose 5839-2.0: <i>To discharge emissions to air at Mokau Road, Uruti</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practical option	Programme management/site inspections	<ul style="list-style-type: none"> - No - Accepting items without authorisation - Objectionable odour on five occasions - 83 complaints received concerning objectionable odour
2. Composting area not to exceed certain limits	Programme management and site inspections	<ul style="list-style-type: none"> - No - Identified significant increase in the size of both pads, which have effectively doubled in size - This to be dealt with during consent renewal - Consent holder to reduce the foot print of pad 1 and 2
3. Only acceptable waste brought onto site	Site inspections and a review of records	<ul style="list-style-type: none"> - No - Material accepted without authorisation (see consent 5838-2.2 condition 10)
4. DAF residue not to be accepted	Site inspections/review of supplied records	<ul style="list-style-type: none"> - Yes
5. Maintain and supply an inwards good register	Inwards goods records supplied	<ul style="list-style-type: none"> - Yes - Data received and reviewed
6. Prepare a Site Practices Plan	Plan submitted with AEE	<ul style="list-style-type: none"> - Yes
7. Adhere to Site Practices Plan	Inspections	<ul style="list-style-type: none"> - No - Compost process only recently monitored. - No compost monitoring observed in the 20-21 monitoring period - Windrow do not appear to be turned often enough - Seagull still on site - No meeting with neighbours undertaken as yet (proposed annually) - No meeting with Ngati Mutunga undertaken as yet (proposed every 6 months)
8. Arrange professional assessment of Site Practices Plan	Supplied in 2010-2011 year.	<ul style="list-style-type: none"> - Yes
9. Submit Proposed Implementation Plan	Plan submitted in the 2011 as defined in Technical report 2015-68	<ul style="list-style-type: none"> - Yes

Purpose 5839-2.0: To discharge emissions to air at Mokau Road, Uruti		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
10. Adhere to Proposed Implementation Plan		<ul style="list-style-type: none"> - Not assessed - Proposal adopted and incorporated into other plans - Defined in Technical report 2015-68
11. Dust deposition not to exceed certain limits	Not monitored	<ul style="list-style-type: none"> - Not assessed-dust not an issue during inspections
12. PM10 and suspended particulate not to exceed certain limits	Not monitored	<ul style="list-style-type: none"> - Not assessed
13. No offensive or objectionable odour beyond the boundary	Inspections	<ul style="list-style-type: none"> - No - Five confirmed odour incidents - 83 complaints
14. Install a weather station and provide data	Inspection and weather updates.	<ul style="list-style-type: none"> - Recently updated October 2020
15. Conduct odour surveys	Undertaken by the Council during inspections and during complaints	<ul style="list-style-type: none"> - Yes
16. Hold community meeting	Meeting held in 2011	<ul style="list-style-type: none"> - No community meeting held in this monitoring period
17. Notify the Council of onsite incidents	No notification received	<ul style="list-style-type: none"> - N/A
18. Prepare a Site Exit Plan prior to site closure	Not provided, though included in current AEE documentation	<ul style="list-style-type: none"> - N/A
19. Adhere to Site Exit Plan upon site closure	N/A	<ul style="list-style-type: none"> - N/A
20. Optional review	A review was not required	<ul style="list-style-type: none"> - N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Poor
Overall assessment of administrative performance in respect of this consent		Poor

Table 43 Summary of performance for consent 5938-2

Purpose 5938-2.0: To use a twin culvert in the Haehanga Stream for vehicle access purposes		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
21. Ensure stream bed downstream is adequately constructed and does not prevent fish passage	Site inspections	<ul style="list-style-type: none"> - Yes - Bed is adequately constructed and does not prevent fish passage. - Regular check undertaken during inspections

Purpose 5938-2.0: To use a twin culvert in the Haehanga Stream for vehicle access purposes		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
22. Maintains the structure so: a. It does not become blocked and is free flowing b. Any erosion or instability of the stream bank is remedied by the consent holder	Site inspections	<ul style="list-style-type: none"> - Yes - Site inspections indicated the Site Manager is continually working on improving this aspect and regularly checks the culvert
23. Review condition	No review pursued	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall administrative performance with respect to this consent		High

Table 44 Summary of performance for consent 6211-1

Purpose 6211-1.0: To realign a stream at Mokau Road, Uruti		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
24. Notification prior to commencement of works	Works undertaken and assessed by investigating officer	Yes
25. Realignment in accordance with application	Site inspections	Yes
26. Best practicable option	Site inspections	Yes
27. Minimisation of discharge	Site inspections	Yes
28. Minimisation of riverbed disturbance	Site inspections	Yes
29. Optional review of consent	No review due this period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall administrative performance with respect to this consent		High

Table 45 Summary of performance for consent 6212-1

Purpose 6212-1.0: <i>To establish and maintain a culvert at Mokau Road, Uruti</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
30. Notification prior to commencement of works	Inspections	<ul style="list-style-type: none"> - Yes - Works undertaken this period and inspectorate were informed, some additional rocks were added to the downstream side of the culvert which lifted the static water level within the stream - Additional work is planned for this summer - The works will be assessed over time to make sure that adequate fish passage is maintained
31. Replacement of temporary culvert	N/A	- Yes
32. Construction in accordance with application	Site inspections	- Yes
33. Best practicable option	Inspections	- Yes
34. Minimisation of riverbed disturbance	Site inspections	- Yes
35. Provision of fish passage	Inspections	<ul style="list-style-type: none"> - Yes - Site inspections indicated that recent works are aiding with fish passage, additional works planned for this summer - Continual monitoring of this will be undertaken
36. Reinstatement of site	N/A	- N/A
37. Optional review of consent	No review due this period	- N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall administrative performance with respect to this consent		High

Table 46 Summary of performance for consent 10063-1.0

Purpose 10063-1.0: To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
38. Authorises the discharge of treated stormwater into unnamed tributary of Haehanga Stream in line with the original application	Inspection-Quarry was not operated this monitoring period, all stormwater directed to grassland off access track via cut-off drain	- Yes
39. Notification of quarry works	Consent exercised	- Yes
40. Adopt best practicable option	Inspection identified the quarry was not operated this monitoring period	- Yes - Cut-off drains inspected and found to be working well. Continually checked by site manager
41. Shall operate and progressively reinstate the quarry site in a manner which ensures exposed areas are kept to a minimum at all times	Not assessed as quarry not operational	- NA
42. Ensure no area greater than 1 ha is exposed at any one time	Online assessment	- Yes - Inspection and online review indicated the current quarry area is 6,000 m ² - The access track is 4,000 m ²
43. The stormwater discharged shall not exceed 4 ha	Not assessed this period	- NA
44. Stormwater treatment system shall be installed before any site works commence	Inspections	- Yes - Inspection indicated the stormwater cut-off drains and sediment traps are on the access track - Continual maintenance is required
45. Stormwater treatment system shall be maintained for the life of the quarry operation	Inspection indicated that this is on-going	- Yes
46. All stormwater to be directed to stormwater treatment system prior to discharge to Haehanga Stream tributary	Inspection	- Yes

Purpose 10063-1.0: To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
47. Constituents of the discharge shall meet the following standards: a. pH: 6.0-9.0 b. suspended solids: <100g/m ³ c. total hydrocarbons: <15 g/m ³	Sampling	- Surface water monitoring at HHG000100 indicated compliance with this condition.
48. The pH may exceed 9.0 if the exceedance is the result of photosynthetic activity, however the discharge shall not alter the receiving waters by more than 0.5 pH after a mixing zone of 25 m	Sampling	- NA
49. After mixing the discharge shall not give rise to any of the following effects: d. Production of scums, films or foams e. Any conspicuous change in the colour or visual clarity f. Any emission of objectionable odour g. Rendering of fresh water unsuitable for farm animal h. Any significant adverse effects on aquatic life	Inspection and sampling	- Yes - Inspections and sampling did not indicate any of the following effects as process of the quarry operations
50. The discharge shall not give rise to any of the following effects: i. A change in turbidity measurements upstream of the discharge point and below the discharge point of more than 5NTU j. A change in turbidity measurements of greater than 5 NTU as a result of the discharge	No turbidity monitoring undertaken this period	- NA
51. Maintain and update Contingency plan	Notification and supply of records	- No - Not supplied

Purpose 10063-1.0: To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
52. Site shall be operated in a management plan which will contain the following: k. The loading and unloading of materials l. Maintenance of conveyance systems m. General housekeeping n. Management of the interceptor system	Supply of management plan-Not received	- No - Not received
53. Notification pertaining to the change of nature of discharge	Notification	- No - None received
54. Consent lapse	Consent in effect	- NA
55. Review condition	No review required quarry non-operational this monitoring period	- NA
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall administrative performance with respect to this consent		Improvement required

Table 47 Summary of performance for consent 10547-1.0

Purpose 10547-1.0: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
56. The culvert pipe shall be a smooth bore plastic pipe and have an internal diameter of no less than 1 metre and be no longer than 40 m	Inspections	- Yes
57. The fill over the top of the culvert pipe shall be comprised of suitable soils free of wood, humus and other organic matter. The embankment shall be well compacted in uniform layers not exceeding 300 mm loose depth to achieve a compaction of at least 95 % of maximum dry density	Inspections	- Yes
58. The fill over the top of the culvert pipe shall be 2.3 m	Inspections	- Yes

Purpose 10547-1.0: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
above the invert of the culvert		
59. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of work	Notification received via inspectorate	- Yes
60. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water		- NA
<p>The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by:</p> <ul style="list-style-type: none"> o. completing all works in the minimum time practicable; p. avoiding placement of excavated material in the flowing channel; q. keeping machinery out of the actively flowing channel, as far as practicable; and r. reinstating any disturbed areas as far as practicable 	Inspections	- Yes
61. A reinforced concrete headwall shall be installed at the inlet to the culvert	Inspections	- Yes
<p>62. A layer of rock riprap 1000 mm thick shall be installed in the stream bed. The riprap shall extend 5 metres downstream of the culvert outlet and 1 metre up the banks on both sides of the stream. The rock shall have the following grading:</p> <ul style="list-style-type: none"> - 100% less than 800 mm diameter; 	Inspections	- Yes

Purpose 10547-1.0: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
<ul style="list-style-type: none"> - 50% greater than 600 mm diameter; - 90% greater than 350 mm diameter 		
63. The culvert shall not restrict fish passage	Not assessed	<ul style="list-style-type: none"> - Not assessed by the Council biologist - This culvert is very large and long. The biologist did not feel safe to enter as it is a confined space
64. The invert of the culvert shall be set below the existing stream bed by 200 mm so that it fills with bed material and simulates the natural bed	To be assessed	<ul style="list-style-type: none"> - NA
65. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site		<ul style="list-style-type: none"> - Yes - On observation this appears to be in line with the gradient
66. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical	Inspections	<ul style="list-style-type: none"> - Yes
<p>67. The culvert shall remain the responsibility of the consent holder and be maintained so that:</p> <ul style="list-style-type: none"> s. it does not become blocked, and at all times allows the free flow of water through it; and t. the consent holder repairs any erosion, scour or instability of the stream bed or banks that the culvert causes 	Inspections	<ul style="list-style-type: none"> - Yes - Maintenance undertaken when required - Regularly inspected

Purpose 10547-1.0: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
68. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council		<ul style="list-style-type: none"> - None reported. - Note this was a replacement culvert
69. This consent shall lapse on 31 March 2023, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991		<ul style="list-style-type: none"> - Exercised
70. Review condition	Not required currently.	<ul style="list-style-type: none"> - NA
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall administrative performance with respect to this consent		High

Table 48 Summary of performance for consent 10843-1

Purpose 10843-1.0: To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
71. The culvert pipe shall have a diameter no less than 900 mm and be no longer than 10 m	Inspections	<ul style="list-style-type: none"> - Yes
72. The fill over the top of the culvert pipe shall be comprised of suitable soils free of wood, humus and other organic matter. The embankment shall be well	Inspections	<ul style="list-style-type: none"> - Yes

Purpose 10843-1.0: To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
compacted in uniform layers not exceeding 300 mm loose depth to achieve a compaction of at least 95% of maximum dry density		
73. The fill over the top of the culvert pipe shall be no less than 4 m		-
74. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive')	Inspections	- Yes
75. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water	Notification received via inspectorate	- Yes
76. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by: <ul style="list-style-type: none"> a) completing all works in the minimum time practicable; b) avoiding placement of excavated material in the flowing channel; c) keeping machinery out of the actively flowing channel, as far as practicable; and d) reinstating any disturbed areas as far as practicable 		- NA
77. A layer of rock riprap 900 mm thick shall be installed in the stream bed. The riprap shall extend 3 m upstream of the culvert inlet and 5 m downstream of the	Inspections	- Yes

Purpose 10843-1.0: To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
culvert outlet and - up the banks on both sides of the stream. The rock shall have the following grading: (a) 100% less than 600 mm diameter; (b) 50% greater than 450 mm diameter; (c) 90% greater than 20 mm diameter		
78. At all times after 1 May 2021 the culvert shall provide for fish passage	Not assessed	<ul style="list-style-type: none"> - Not assessed by the Council biologist - This will be assessed this summer
79. The invert of the culvert shall be set below the existing stream bed by 225 mm that it fills with bed material and simulates the natural bed	To be assessed	<ul style="list-style-type: none"> - NA
80. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site		<ul style="list-style-type: none"> - Yes - On observation this appears to be in line with the gradient
81. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical	Inspections	<ul style="list-style-type: none"> - Yes
82. The culvert shall remain the responsibility of the consent holder and be maintained so that: a) it does not become blocked, and at all times allows the free flow of water through it; and b) the consent holder repairs any erosion, scour or instability of the stream bed or banks that the culvert causes	Inspections	<ul style="list-style-type: none"> - Yes - Maintenance undertaken when required - Regularly inspected

Purpose 10843-1.0: <i>To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
83. This consent lapses 5 years after its commencement date (shown on the front of this document), unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period in accordance with section 125(1)(b) of the Resource Management Act 1991		- Exercised
84. Review condition	Not required currently.	- NA
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall administrative performance with respect to this consent		High

Table 49 Summary of performance for consent 10825-1.0

Purpose 10825-1: <i>To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
85. This consent authorises the permanent diversion of the full stream flow through two sections of reconstructed channel on two unnamed tributaries, between grid references: Please consent for reference	Inspections	- Yes
86. The new stream channels shall have a flow capacity no less than that of the existing stream channels	Inspections	- Yes
87. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive')	Inspections	- Yes
88. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity	Inspections	- Yes - Council informed during the development

Purpose 10825-1: To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
during installation of the culvert, including by: a) completing all works in the minimum time practicable; b) avoiding placement of excavated material in the flowing channel; c) keeping machinery out of the actively flowing channel, as far as practicable; and reinstating any disturbed areas as far as practicable		
89. The channels shall be constructed to include sequences of runs and riffles that simulate the natural bed where the original stream bed is no longer present or stable	Inspections	- Yes
90. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.	Notification received via inspectorate	- Yes
91. The consent holder shall prepare and implement a fish recovery plan that has been certified by the Chief Executive of the Taranaki Regional Council. The plan shall detail how the impacts on fish during culvert installation are avoided as far as practical, and shall include as a minimum how fish will be salvaged, how often fish will be salvaged, and recording the number and types of fish salvaged	Provided to the Council	- Yes
92. The new channel shall not restrict fish passage	Inspections	- Yes
93. At all times during the works the consent holder shall ensure that the stream flow downstream of the	Inspections	- Yes

Purpose 10825-1: To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
affected reach is not significantly diminished		
94. On completion of the realignment work: a) the banks of the reconstructed channel shall have a slope no steeper than 1.5 horizontal to 1 vertical; and b) the bed of the reconstructed channel shall be at an appropriate grade so as to provide for upstream fish passage	Inspections	- Yes
95. The consent holder shall ensure that rock riprap is placed in the stream bed at all bends in the new channels. The riprap shall be placed within the entire bed width and up the banks of the new stream channel	Inspections	- Yes
96. The rock riprap shall be no less than 0.9 metres thick, and of the following grading: a) 100% less than 600 mm diameter; b) 50% greater than 450 mm diameter; c) 90% greater than 200 mm diameter	Inspections	- Yes
97. The consent holder shall maintain the realigned channel by repairing any erosion, scour or instability of the stream bed or banks	Inspections	- Yes
98. The consent holder shall undertake and maintain riparian fencing and planting on the tributaries affected by the realignment, in accordance with the Riparian Management Plan for the property. An area of not less than 5 m shall be	Inspections	- No, further works required, though planned by the consent holder

Purpose 10825-1: To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
planted between the stream bed and fence		
99. The fencing and riparian planting required in condition 14 shall be completed before August 2021	Inspections	- No, though planned and occurring in the 21-22 monitoring period
100. To remedy and mitigate the adverse environmental effects of this consent, the consent holder shall establish and maintain riparian planting and a wetland as detailed in the 'Wetland Restoration Management Plan' provided with the application and attached as Appendix 1. The works shall be undertaken within the timeframes specified in that plan	Inspections	- This is planned to be achieved over a three year period. - Year 1 is mostly completed
101. All earthwork areas shall be stabilised as soon as is practicable immediately following completion of soil disturbance activities	Inspections	- Yes
102. This consent lapses 5 years after its commencement date (shown on the front of this document), unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period in accordance with section 125(1)(b) of the Resource Management Act 1991		- Exercised
103. Review condition	Not required currently.	- NA
Overall assessment of consent compliance and environmental performance in respect of this consent Overall administrative performance with respect to this consent		High High

Table 50 Summary of performance for all consents

Consent	Environmental Performance	Administrative performance
5838-2.2 (Discharge waste to land and water, Uruti)	Poor	Poor
5839-2 (Discharge emissions to air, Uruti)	Poor	Poor
5938-2.0 (Twin culvert Uruti)	High	High
6211-1 (Haehanga realignment Uruti)	High	High
6212-1 (Culvert, Uruti)	Good	High
10063-1.0 Quarry discharge	Good	Improvement required
10547-1.0 Culvert unnamed tributary	High	High
10843-1.0 To modify a culvert to provide for fish passage	High	High
10825-1.0 To realign a section of two unnamed tributaries	High	High

Table 51 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2013-2014	5838-2				1
	5839-2		1		
	5892-2	1			
	5893-2	1			
	5938-1	1			
	6211-1	1			
	6212-1		1		
2014-2015	5838-2			1	
	5839-2		1		
	5892-2	1			
	5893-2	1			
	5938-1	1			
	6211-1	1			
	6212-1			1	
2015-2016	5838-2.2			1	
	5839-2	1			
	5893-2	1			
	5892-2	1			
	5938-2.2			1	
	6211-1	1			
	6212-1			1	

Year	Consent no	High	Good	Improvement req	Poor
	10063-1.0				
2016-2017	5838-2.2		1		
	5839-2	1			
	5893-2	1			
	5892-2	1			
	5938-2.2			1	
	6211-1	1			
	6212-1			1	
	10063-1.0				
2017-2018	5838-2.2			1	
	5839-2		1		
	5893-2	1			
	5892-2			1	
	5938-2.0	1			
	6211-1	1			
	6212-1	1			
	10063-1.0	Not assessed as quarry operations suspended			
2018-2019	5838-2.2				1
	5839-2			1	
	5892-2	1			
	5938-2		1		
	6211-1	1			
	6212-1		1		
	10063-1.0		1		
	10547-1.0	1			
2019-2020	5838-2.2			1	
	5839-2				1
	5892-2	1			
	5938-2	1			
	6211-1	1			
	6212-1		1		
	10063-1.0		1		
	10547-1.0	1			
Totals		27	10	11	3

During the year, the Company demonstrated a poor level of environmental and poor level of administrative performance with the resource consents as defined in Section 1.1.4.

3.4 Recommendations from the 2019-2020 Annual Report

In the 2019-2020 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at Uruti site in the 2020-2021 year continue at the same level as in 2019-2020, with the inclusion of the following:
2. THAT the implementation of a telemetered in-situ water quality probe be installed, at the consent holder's expense, as soon as practicable.
3. Increased focus on ammonia and dissolved reactive phosphorus monitoring within the surface waters.
4. Consideration of increasing the frequency of surface water monitoring round frequency to monthly to provide a more comprehensive understanding of water quality impacts in-stream.
5. Bacteriological monitoring (*E.coli*) of the Haehanga Stream and the above and below the confluence with the Mimitangiatua River.
6. Consideration of targeted odour surveys in order to access for objectionable odour.
7. It is proposed that for 2020-2021 monitoring period that the monitoring of the consented activities at the blending facility located on the Waitara Road, Brixton, continue at the same level as that undertaken in the 2019-2020 monitoring period.
8. THAT should there be issues with environmental or administrative performance in 2020-2021, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

In terms of the recommendations undertaken:

- An in-situ probe has been added to the compliance monitoring programme and is likely to be installed in November 2021.
- Instream ammoniacal nitrogen is now assessed against the NPS-FM with pH modified to 8 pH utilising field data pH.
- Dissolved reactive phosphorus (DRP) added to the final monitoring rounds and is now part of the surface water monitoring programme.
- Monthly surface water monitoring was considered. In-situ probe will be used as an interim measure to identify unauthorised discharges, with further consideration given to monthly monitoring should this identify issues.
- Bacteriological monitoring instilled in programme and Mimitangiatua River now monitored at two locations, with the option of a third.
- Discussions to lift curfew on night time call-outs under consideration to allow for targeted odour surveys, after hours.
- Waitara Road will now be reported separately, at the request of the Company.
- The monitoring analytes were significantly extended this monitoring period due to the identification of LOSP chemicals at the site.

3.5 Alterations to monitoring programmes for 2021-2022

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information already made available through monitoring or other means to date;
- its relevance under the RMA;
- the Council's obligations to monitor consented activities and their effects under the RMA;

- the record of administrative and environmental performances of the consent holder; and
- reporting to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki exercising resource consents.

The 2021-2022 monitoring programme, for the most part remains unchanged, with the addition of the following:

9. Multi-parameter sonde to be installed in the Haehanga Stream to continuously monitor electrical conductivity, temperature and level. Further parameters can be added to this device in future monitoring periods. This data will be telemetered directly to the Council. Consideration will be given to monthly monitoring should the probe identify issues.
10. Organonitro and phosphorus pesticide screening has been added to the monitoring of groundwater (all wells), and surface water (nine of 18 sites). Soil monitoring will also include these analytes.
11. The Waitara Road facility will be reported separately, at the request of the Company.
12. Two sites have been added to the surface water monitoring. These two are located on the Mimitangiatua River.
13. Calibrated field pH results (collected by YSi multi parameter field probe) will be utilised for ammoniacal nitrogen pH adjustment to pH 8, for equivalent toxicity, as required for comparison to the NPS-FM guideline.
14. Bacteriological samples are now collected during the surface water monitoring rounds.
15. Dissolved reactive phosphorus has been added to the surface water monitoring.
16. Summer monitoring will attempt to target worst case scenario pH results. These will likely be mid to late afternoon. Though courier pick up time will cap how late in the afternoon the samples can be collected and then sent, as they will contain bacteriological samples, which have a time period.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2021-2022.

4 Recommendations

17. THAT in the first instance, monitoring of consented activities at Uruti composting in the 2021-2022 year continue at the same level as in 2020-2021 with the addition of the following:
18. Multi-parameter sonde to be installed in the Haehanga Stream to continuously monitor electrical conductivity, temperature and level. Further parameters can be added to this device in future monitoring periods. This data will be telemetered directly to the Council. Consideration will be given to monthly monitoring should the probe identify issues.
19. Organonitro and phosphorus pesticide screening has been added to the monitoring of groundwater (all wells), and surface water (nine of 18 sites). Soil monitoring will also include these analytes.
20. The Waitara Road facility will be reported separately, at the request of the Company.
21. Two sites, located on the Mimitangiatua River, have been added to the surface water monitoring.
22. Calibrated field pH results (collected by YSi multi parameter field probe) will be utilised for ammonia pH modification to pH 8, as required for comparison to the NPS-FM guideline.
23. Bacteriological samples are now collected during the surface water monitoring rounds.
24. Dissolved reactive phosphorus has been added to the surface water monitoring.
25. Summer monitoring will attempt to target worst-case scenario pH results. These will likely be mid to late afternoon. Though courier pick up time will cap how late in the afternoon the samples can be collected and then sent, as they will contain bacteriological samples, which have a time period.
26. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

Al*	Aluminium.
As*	Arsenic.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in $\mu\text{S}/\text{cm}$.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second ($1 \text{ m}^3\text{s}^{-1}$).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
<i>E. coli</i>	<i>Escherichia coli</i> , an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
FNU	Formazin nephelometric units, a measure of the turbidity of water.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$\text{g}/\text{m}^2/\text{day}$	grams/metre ² /day.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.

Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
LOD	The limit of detection (LOD) is defined as the lowest concentration of an analyte in a sample that can be consistently detected with a stated probability (typically at 95% certainty).
m ²	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
MPN	Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample.
mS/m	Millisiemens per meter.
µS/cm	Microsiemens per centimetre.
NH ₄	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH ₃	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO ₃	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).

Turb	Turbidity, expressed in NTU or FNU.
Zn*	Zinc.

*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

For further information on analytical methods, contact a Science Services Manager.

Bibliography and references

- Ministry for the Environment. 2018. *Best Practice Guidelines for Compliance, Monitoring and Enforcement under the Resource Management Act 1991*. Wellington: Ministry for the Environment.
- Ministry for the Environment. 2018. *Best Practice Guidelines for Compliance, Monitoring and Enforcement under the Resource Management Act 1991*. Wellington: Ministry for the Environment.
- New Zealand Government National Policy Statement for Freshwater Management 2020 (August 2020).
- BTW Company Ltd-Uruti Compost Facility Management Plan-Remediation New Zealand 2015.
- Pattle Delamore Partners LTD: Odour advice for the Uruti composting and vermiculture facility. 18 December 2020
- Taranaki Regional Council: Clements, KC031K: 2021 Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, January 2021.
- Taranaki Regional Council: Clements, KC016: 2020 Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, January 2020. KB016.
- Taranaki Regional Council: Clements, KC006: 2019 Fish survey of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, April 2019.
- Taranaki Regional Council 2020: Remediation NZ Ltd Uruti and Waitara Road Monitoring Programme Annual Report 2019-2020 Technical Report 2020-84. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2019: Remediation NZ Ltd Uruti Waitara and Pennington Road Monitoring Programme Annual Report 2018-2019 Technical Report 2019-50. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2018: Remediation NZ Ltd Uruti Waitara and Pennington Road Monitoring Programme Annual Report 2017-2018 Technical Report 2018-79. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2017: Remediation NZ Ltd Monitoring Programme Annual Report 2016-2017 Technical Report 2017-11. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2016: Remediation NZ Monitoring Programme Annual Report 2015-2016. Technical Report 2016-83. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2015: Remediation NZ Monitoring Programme Annual Report 2014-2015. Technical Report 2015-68. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2014: Remediation NZ Monitoring Programme Annual Report 2013-2014. Technical Report 2014-53. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2013: Remediation NZ Monitoring Programme Annual Report 2012-2013. Technical Report 2013-64. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2011: Remediation NZ Monitoring Programme Annual Report 2011-2012. Technical Report 2012-39. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2011: Remediation NZ Monitoring Programme Annual Report 2010-2011. Technical Report 2011-44. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2010: Remediation NZ Monitoring Programme Annual Report 2009-2010. Technical Report 2010-44. Taranaki Regional Council, Stratford.

- Taranaki Regional Council 2009: PEL Waste Services/Remediation NZ Monitoring Programme Annual Report 2008-2009. Technical Report 2009-49. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2009: PEL Waste Services Limited (formerly Perry Environmental Limited) Monitoring Programme Annual Report 2007-2008. Technical Report 2008-94. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2007: PEL Waste Services Limited (formerly Perry Environmental Limited) Monitoring Programme Annual Report 2006-2007. Technical Report 2007-112. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2006: Perry Environmental Limited Monitoring Programme Annual Report 2005-2006. Technical Report 2006-26. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2005: Perry Environmental Limited Monitoring Programme Annual Report 2004-2005. Technical Report 2005-12. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2004: Perry Environmental Limited Monitoring Programme Annual Report 2003-2004. Technical Report 2004-26. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2003: Perry Environmental Limited Monitoring Programme Annual Report 2002-2003. Technical Report 2003-37. Taranaki Regional Council, Stratford.
- Taranaki Regional Council 2002: Global Vermiculture Limited Monitoring Programme Annual Report 2001-2002. Technical Report 2002-25. Taranaki Regional Council, Stratford.

Appendix I

Resource consents held by Remediation New Zealand Ltd Uruti Composting Facility

(For a copy of the signed resource consent
please contact the TRC Consents department)

Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

Discharge Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
PO Box 8045
New Plymouth 4342

Decision Date
(Change): 20 August 2015

Commencement Date
(Change): 20 August 2015 (Granted Date: 27 May 2010)

Conditions of Consent

Consent Granted: To discharge:
a) waste material to land for composting; and
b) treated stormwater and leachate from composting operations;
onto and into land in circumstances where contaminants may
enter water in the Haehanga Stream catchment and directly into
an unnamed tributary of the Haehanga Stream

Expiry Date: 1 June 2018

Review Date(s): June 2016, June 2017

Site Location: 1450 Mokau Road, Uruti

Legal Description: Sec 34 Pt Sec 4 Blk II Upper Waitara SD (Discharge site)

Grid Reference (NZTM) Between 1731656E-5686190N, 1733127E-5684809N,
1732277E-5685101N, 1732658E-5684545N &
1732056E-5684927N

Catchment: Mimi

Tributary: Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

Acceptable wastes

2. The raw materials accepted onsite shall be limited to the following:
 - Paunch grass;
 - Animal manure from meat processing plant stock yards and dairy farm oxidation pond solids;
 - Green vegetative wastes;
 - Biosolids wastes including, but not limited to, pellets from wastewater treatment plants;
 - Mechanical pulping pulp and paper residue (excluding any pulping wastes that have been subject to chemical pulping or treated or mixed with any substance or material containing chlorine or chlorinated compounds);
 - Solid drilling cuttings from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0% total petroleum hydrocarbon within 3 days of being received onsite;
 - Water based and synthetic based drilling fluids from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0% total petroleum hydrocarbon content within 3 days of being brought onto the site;
 - Produced water from hydrocarbon exploration;
 - Vegetable waste solids (being processing by-products);
 - Grease trap waste (from food service industries);
 - Fish skeletal and muscle residue post filleting (free from offal); and
 - Poultry industry waste (eggshells, yolks, macerated chicks and chicken mortalities).

The acceptance of any other materials shall only occur if the Chief Executive, Taranaki Regional Council advises in writing that he is satisfied on reasonable grounds that the other materials will have minimal effects beyond those materials listed above.

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3. Before bringing waste to the site the consent holder shall take a representative sample of each type of drilling waste permitted under condition two from each individual source, and have it analysed for the following:
 - a. total petroleum hydrocarbons (C₆-C₉, C₁₀-C₁₄, C₁₅-C₃₆);
 - b. benzene, toluene, ethylbenzene, and xylenes;
 - c. polycyclic aromatic hydrocarbons screening;
 - d. heavy metals screening; and
 - e. chloride, nitrogen, pH, potassium, and sodium.

The results of the analysis require by this condition shall be forwarded to the Chief Executive, Taranaki Regional Council every three months or upon request.

4. Material produced as a result of a dissolved air flotation process shall not be accepted on site.

Maintenance of measures

5. All sediment ponds and silt traps on site, that are located upstream of the pond treatment system or wetland treatment system, shall be managed so that they are no more than 20% full of solids at any one time.

Note: For the purposes of this condition, the location of the pond treatment system and wetland treatment system are shown on Figure 1, attached as Appendix 1 of this consent.

6. All treatment measures on site shall be implemented and maintained so that:
 - clearwater runoff is prevented from entering Pad 1, Pad 2 and the Drill Mud Pad; and
 - all stormwater and/or leachate from Pad 1, Pad 2, the Drill Mud Pad and any other exposed areas within the composting site is directed for treatment through the Pond or Wetland Treatment System.

Note: For the purposes of this condition, the location and extent of Pad 1, Pad 2 and the Drill Mud Pad are shown on Figure 1, attached as Appendix 1 of this consent.

7. Any pond(s) used on site for the purposes of stormwater and leachate treatment shall be constructed and maintained in a manner which prevents the seepage of wastewater through the pond liners entering surface water or groundwater.

Irrigation

8. The consent holder shall record the following information in association with irrigating wastewater to land:
 - a) the date, time and hours of irrigation;
 - b) the volume of wastewater irrigated to land;
 - c) the conductivity of the irrigation fluid (measured in mS/m);
 - d) the source of the wastewater (e.g. Pond or Wetland Treatment System); and
 - e) the location and extent where the wastewater was irrigated.

The above records shall be made available to the Chief Executive, Taranaki Regional Council, on request.

9. There shall be no direct discharge to water as a result of irrigating wastewater to land. This includes, but is not necessarily limited to, ensuring the following:
 - No irrigation shall occur closer than 25 metres to any surface water body;
 - The discharge does not result in surface ponding;
 - No spray drift enters surface water;
 - The discharge does not occur at a rate at which it cannot be assimilated by the soil/pasture system; and
 - The pasture cover within irrigation areas is maintained at all times.
10. Treated wastewater discharged by irrigation to land shall not have a hydrocarbon content exceeding 5% total petroleum hydrocarbon or a sodium adsorption ratio exceeding 18.
11. Discharges irrigated to land shall not give rise to any of the following adverse effects in the Haehanga Stream, after a mixing zone extending 30 metres from the downstream extent of the irrigation areas;
 - a) a rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm⁻³;
 - b) a level of unionised ammonia greater than 0.025 gm⁻³;
 - c) an increase in total recoverable hydrocarbons;
 - d) chloride levels greater than 150 g/m³;
 - e) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - f) any conspicuous change in the colour or visual clarity;
 - g) any emission of objectionable odour;
 - h) the rendering of fresh water unsuitable for consumption by farm animals; and
 - i) any significant adverse effects on aquatic life.

Soil quality

12. Representative soil samples shall, be taken from each irrigation area at intervals not exceeding 6 months and analysed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylene.
13. Representative soil samples shall be taken from each irrigation area at intervals not exceeding 3 months and analysed for chloride, sodium, magnesium, calcium, potassium, total, soluble salts, and conductivity.
14. Before 30 November 2015 the holder shall review and update the Uruti Composting Facility Management Plan supplied in support of application 5838-2.2 and any changes shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall be adhered to and reviewed on an annual basis (or as required) and any changes shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall include but not limited to:
 - a) Trigger limits for the three tier management system tiers set out in section 3.1 of the Uruti Composting Facility Management Plan;
 - b) Monitoring frequencies of soil and groundwater in Tiers one, two, and three;
 - c) Remediation options for Tier three irrigation areas;
 - d) Riparian planting of irrigation areas;
 - e) Stormwater improvements at the site ;
 - f) Water storage for dilution and remediation; and
 - g) Soil and groundwater data analysis.

Groundwater quality

15. The consent holder shall establish and maintain at least one groundwater monitoring well at each of the following locations for the purpose of monitoring the effect of the wastewater discharges on groundwater quality:
- up gradient of the irrigation areas in an un-impacted area;
 - down gradient of the extent of the irrigation of each area;
 - down gradient of the duck pond and drill mud pits and up gradient of irrigation area H for the purpose of assessing integrity clay liners of drilling waste treatment ponds, and
 - at NZTM 1731518N-5686536E (approximately 40 metres south of SH3) for the purpose of assess groundwater near the northern boundary.

For the purposes of clarification this condition requires four new bores to be installed for the purposes of establishing irrigation areas F & E and in accordance with the Uruti Composting Facility Management Plan 2015 supplied with application 5838-2.2.

16. Any new groundwater monitoring wells required by condition 15 shall be installed to the following standards;
- Prior to installation of any new wells, confirmed NZTM GPS locations shall be provided to the Taranaki Regional Council for approval;
 - All new wells shall be at least 25 metres from any water way (unless otherwise authorised by a separate consent) and be accessible by vehicle;
 - All new wells shall be installed by a qualified driller and designed to encounter groundwater and accommodate expected annual fluctuations in water level -i.e. screened sections and filter packs to be located next to the water bearing horizons;
 - Soils encountered during installation shall be logged by a suitably qualified and graphic logs of the soils and well construction are to be supplied to the Taranaki Regional Council;
 - All new wells shall be surveyed for topographical elevation by a suitably qualified person;
 - All wells shall completed with an appropriate riser, riser cap, toby and be fenced to prevent stock access;
 - Prior to any irrigation occurring in any new irrigation area, a groundwater sample shall be collected from the down gradient well by a suitably qualified person, using a method approved by the Chief Executive of the Taranaki Regional Council and analysed and analysed for sodium, calcium, magnesium, nitrate, ammoniacal nitrogen, pH, chloride, and conductivity.

Adherence to New Zealand Standard 4477:2001 will ensure compliance with this condition.

17. The consent holder shall undertake weekly groundwater level, temperature, and conductivity readings from each well within a single eight hour period using a method approved by the Chief Executive, Taranaki Regional Council. Results shall be recorded in a cumulative spread sheet, a copy of which shall be forwarded to the Taranaki Regional Council every three months, or upon request.

18. Groundwater samples shall be collected from all monitoring wells required under condition 15 at intervals not exceeding 6 months by a suitably qualified person using a method approved by the Chief Executive, Taranaki Regional Council and analysed for; total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylene, lead and arsenic.
19. Groundwater samples shall be collected from all monitoring wells required under condition 15 at intervals not exceeding 3 months by a suitably qualified person using a method approved by the Chief Executive, Taranaki Regional Council and analysed for; chloride, sodium, magnesium, calcium, total soluble salts, and conductivity.

Pond Treatment System

20. The consent holder shall prepare a Pond Treatment System Management Plan which details management practices undertaken to maximise treatment capabilities of the system. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the commencement date of this consent.

The Management Plan shall address, but not necessarily be limited to, the following matters:

- a) how the build up of sediment and/or sludge will be managed within the entire system, how the level of build-up will be monitored including factors that will trigger management, and the frequency of undertaking the identified measures or procedures;
 - b) how overloading of the system will be prevented; and
 - c) how any offensive or objectionable odours at or beyond the site boundary will be avoided in accordance with condition 13 of consent 5839-2.
21. Operations on site shall be undertaken in accordance with the Pond Treatment System Management Plan, approved under condition 20 above, except in circumstances when the Proposed Implementation Plan, approved under condition 9 of consent 5839-2, specifies otherwise.

Wetland Treatment System

22. The consent holder shall prepare a Wetland Treatment System Management Plan that details management practices undertaken to maximise treatment capabilities of the system. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the commencement date of this consent.

The Management Plan shall address, but not necessarily be limited to, the following matters:

- a) how the build up of sediment and/or sludge will be managed within the entire system, how the level of build-up will be monitored including factors which will trigger management, and the frequency of undertaking the identified measures or procedures; and
- b) how plant die-off within the system will be managed, and the frequency and/or timing of undertaking the identified measures or procedures.

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23. Operations on site shall be undertaken in accordance with the Wetland Treatment System Management Plan, approved under condition 22 above.
24. The discharge from the Wetland Treatment System shall meet the following standards (at monitoring site IND003008):
 - a) the suspended solids concentration shall not exceed 100 g/m³; and
 - b) the pH shall be between 6.0 and 9.0.
25. Discharges from the Wetland Treatment System shall not give rise to any of the following effects in the unnamed tributary of the Haehanga Stream, after a mixing zone of 40 metres, at established monitoring site HHG000103 (at or about grid reference 1732695E-5685050N):
 - a) a rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm⁻³;
 - b) a level of unionised ammonia greater than 0.025 gm⁻³;
 - c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - d) any conspicuous change in the colour or visual clarity;
 - e) any emission of objectionable odour;
 - f) the rendering of fresh water unsuitable for consumption by farm animals; and
 - g) any significant adverse effects on aquatic life.

Riparian planting

26. The consent holder shall maintain the areas of riparian planting, undertaken in accordance with option 1 of riparian management plan RMP383, by ensuring the ongoing replacement of plants which do not survive, the eradication of weeds until the plants are well established, and the exclusion of stock from the planted areas.

Incident notification

27. The consent holder shall keep a permanent record of any incident related to this consent that results, or could result, in an adverse effect on the environment. The consent holder shall make the incident register available to the Taranaki Regional Council on request.

Details of any incident shall be forwarded to the Taranaki Regional Council immediately. At the grant date of this consent, the Taranaki Regional Council's phone number is 0800 736 222 (24 hour service).

Site reinstatement

28. The consent holder shall prepare a Site Exit Plan which details how the site is going to be reinstated prior to the consent expiring or being surrendered. The Plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, at least 6 months prior to this consent expiring or being surrendered.

The Site Exit Plan shall address, but not necessarily be limited to, the following matters:

- a) How the site will be reinstated so that no raw materials listed or approved under condition 2 of this consent remain on site;
- b) How the site will be reinstated so that no partially decomposed material remains on site;

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- c) How any remaining leachate or sludge, resulting from the operation, will be either removed from the site, buried, treated or otherwise to avoid any adverse effects on groundwater or surface water;
- d) The remediation of irrigated soils and groundwater; and
- e) Timeframes for undertaking the activities identified in association with a) to c) above.

Note: The requirement of this condition shall not apply if the consent holder applies for a new consent to replace this consent when it expires.

- 29. The consent holder shall reinstate the site in accordance with the plan approved under condition 28 above prior to this consent expiring or being surrendered.

Review

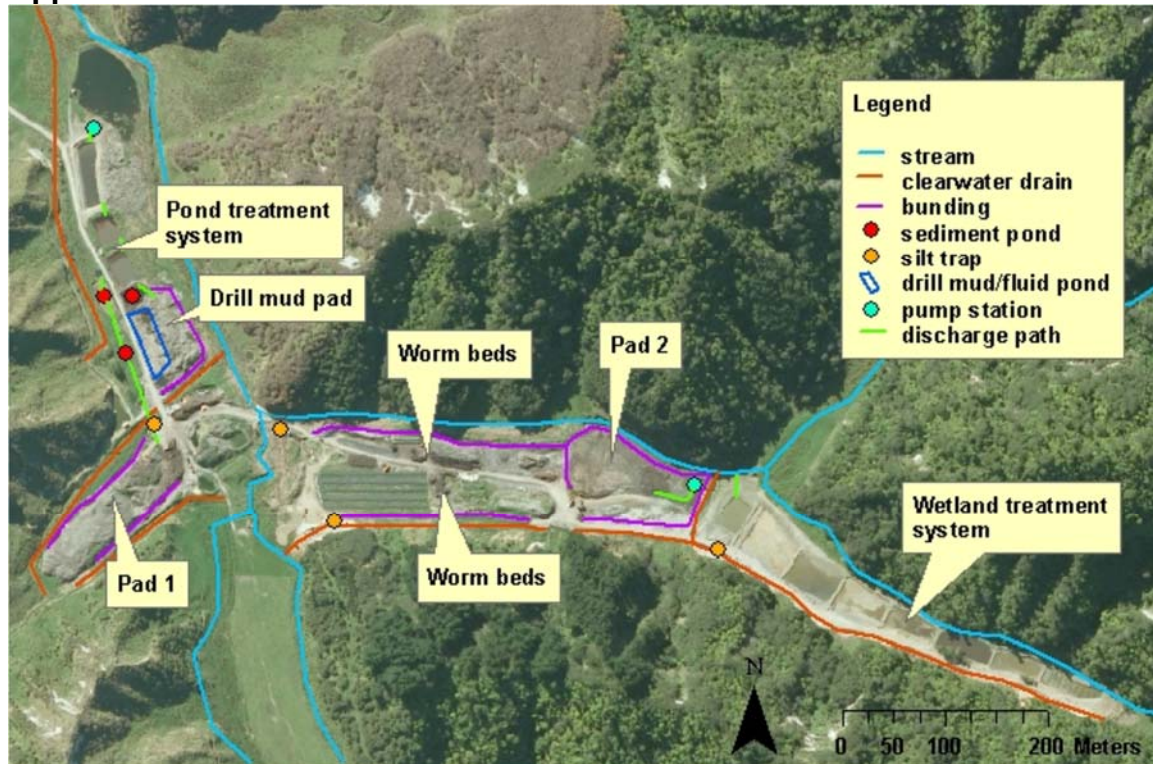
- 30. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review within one month of approving the plan required under condition 9 of consent 5839-2 and/or during the month of June in any year for any of the following purposes:
 - a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to odour discharges from the site and/or water quality issues;
 - b) To incorporate into the consent any modification to the operation and maintenance procedures or monitoring that may be necessary to deal with any adverse effects on the environment arising from changes in association with condition 9 of consent 5839-2; and
 - c) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges and/or odour from the site.

Signed at Stratford on 20 August 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Appendix 1 of consent 5838



Discharge Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
P O Box 8045
NEW PLYMOUTH 4342

Decision Date: 27 May 2010

Commencement
Date: 18 June 2010

Conditions of Consent

Consent Granted: To discharge emissions into the air, namely odour and dust, from composting operations between (NZTM) 1731704E-5685796N, 1733127E-5684809N, 1732277E-5685101N, 1732451E-5684624N and 1732056E-5684927N

Expiry Date: 1 June 2018

Review Date(s): June 2011, June 2012, June 2013, June 2014, June 2015, June 2016, June 2017

Site Location: 1450 Mokau Road, Uruti

Legal Description: Sec 34 Pt Sec 4 Blk II Upper Waitara SD

General condition

- a. The consent holder shall pay to the Taranaki Regional Council [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

General

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
2. The surface areas of Pad 1 and Pad 2 shall not exceed 3,500 m² and 4,000 m², respectively.

Note: For the purposes of this condition, the location and extent of Pad 1 and Pad 2 are shown on Figure 1, attached as Appendix 1 of this consent.

Incoming material

3. The raw materials accepted onsite shall be limited to the following:
 - Paunch grass;
 - Animal manure from meat processing plant stock yards and dairy farm oxidation pond solids;
 - Green vegetative wastes;
 - Biosolids wastes including, but not limited to, pellets from wastewater treatment plants;
 - Mechanical pulping pulp and paper residue [excluding any pulping wastes that have been subject to chemical pulping or treated or mixed with any substance or material containing chlorine or chlorinated compounds];
 - Solid drilling cuttings from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0 % total petroleum hydrocarbon within 3 days of being received onsite;
 - Water based and synthetic based drilling fluids from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0 % total petroleum hydrocarbon content within 3 days of being brought onto the site;
 - Produced water from hydrocarbon exploration;
 - Vegetable waste solids [being processing by-products];
 - Grease trap waste [from food service industries];
 - Fish skeletal and muscle residue post filleting [free from offal]; and
 - Poultry industry waste [eggshells, yolks, macerated chicks and chicken mortalities].

The acceptance of any other materials shall only occur if the Chief Executive, Taranaki Regional Council advises in writing that he is satisfied on reasonable grounds that the other materials will have minimal effects beyond those materials listed above.

4. Material produced as a result of a dissolved air flotation process shall not be accepted on site.

5. The consent holder shall record the following information in association with accepting all incoming material on site:
- a) the date and time that the material is accepted;
 - b) description of the material; and
 - c) the approximate volumes of material.

The above records shall be made available to the Chief Executive, Taranaki Regional Council, on request.

Management practices

6. The consent holder shall prepare a Site Practices Management Plan which details management practices undertaken to ensure that offensive or objectionable odours at or beyond the site boundary will be avoided in accordance with condition 13 of this consent. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the commencement date of this consent.

The Management Plan shall address, but not necessarily be limited to, the following matters:

- a) identification of all activities on site which have the potential to generate odour [e.g. turning compost piles, removing sludge from ponds];
 - b) the conditions and/or time of day when activities identified under a) above should be undertaken [e.g. during favourable weather conditions and the identification of those conditions] and/or measures that shall be implemented to avoid odours arising [e.g. containment measures];
 - c) measures undertaken to minimise odours during receiving and storing material on Pad 1 and Pad 2 and throughout the composting and vermiculture processes [e.g. method[s] used to cover material once received, how anaerobic conditions are maintained];
 - d) measures undertaken to minimise odours arising in the Wetland Treatment System, and identification of the time of year and/or frequency when undertaken;
 - e) measures undertaken to minimise odours arising in the Pond Treatment System and associated treatment measures [e.g. silt traps located upstream], and identification of the time of year and/or frequency when undertaken; and
 - f) details of how a complaint investigation procedure shall operate, including what data shall be collected and what feedback is to be provided to the complainant.
7. Operations on site shall be undertaken in accordance with the Site Practices Management Plan, approved under condition 6 above, except in circumstances when the Proposed Implementation Plan, approved under condition 9 of this consent, specifies otherwise.

Site audit and implementation

8. The consent holder shall engage a suitably qualified and experienced professional to prepare and submit an Odour Assessment Report for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within three months of the commencement date of this consent. The professional that the consent holder engages shall be to the reasonable approval of the Chief Executive, Taranaki Regional Council.

The report shall include, but not necessarily be limited to, the following:

- a) The appropriateness of the management practices and control measures undertaken in avoiding offensive and/or objectionable odours arising beyond the property boundary in association with the composting processes on Pad 1;
- b) Recommendations in association with a) above;
- c) The appropriateness of the design and management of the Pond Treatment System and associated pre-treatment devices (e.g. silt ponds) in effectively managing odours arising from treating leachate derived from Pad 1 and avoiding offensive and/or objectionable odours arising beyond the property boundary; and
- d) Recommendations in association with c) above.

For assisting with the above assessment, the consent holder shall provide a copy of the documents listed below to the engaged and approved professional:

- The Taranaki Regional Council final officers report and hearing decision report for applications 5276 and 5277;
- Consent certificates [including conditions] for consents 5838-2 and 5839-2;
- The Pond Treatment System Management Plan approved under condition 18 of consent 5838-2; and
- The Site Practices Management Plan approved under condition 6 of this consent.

9. The consent holder shall prepare and submit a Proposed Implementation Plan for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the Odour Assessment Report being approved under condition 8 above.

The Plan shall include, but not necessarily be limited to, the following:

- a) Management practices and/or control measures proposed to be implemented in association with the composting processes on Pad 1, of which are from the recommendations of the Odour Assessment Report, approved in accordance with condition 8;
- b) Management practices and/or control measures proposed to be implemented in association with the Pond Treatment System, of which are from the recommendations of the Odour Assessment Report, approved in accordance with condition 8;
- c) The reasons for the chosen practices and/or measures identified in accordance with a) and b) above
- d) A timeframe by when each of the practices and/or measures identified in accordance with a) and b) above will be implemented

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- e) Identification of appropriate management practices to ensure the on-going functionality of any chosen control measures identified in accordance with a) and b) above
10. Operations and activities on site shall be undertaken in accordance with the Proposed Implementation Plan, approved under condition 9 above.

Dust

11. The dust deposition rate beyond the boundary of the consent holder's site arising from the discharge shall be less than 4.0 g/m²/30 days.

Note: For the purposes of this condition, the consent holder's site is defined as Sec 34 Pt Sec 4 Blk II Upper Waitara SD.

12. Any discharge to air from the site shall not give rise to any offensive, objectionable, noxious or toxic levels of dust at or beyond the boundary of the consent holder's site, and in any case, total suspended particulate matter shall not exceed 120 µg/m³ as a 24 hour average [measured under ambient conditions] beyond the boundary of the consent holder's site.

Note: For the purposes of this condition, the consent holder's site is defined as Sec 34 Pt Sec 4 Blk II Upper Waitara SD.

Odour

13. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the consent holder's site that is offensive or objectionable.

Note: For the purposes of this condition:

- The consent holder's site is defined as Sec 34 Pt Sec 4 Blk II Upper Waitara SD; and
- Assessment under this condition shall be in accordance with the *Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.*

Monitoring

14. The consent holder shall install a monitoring device that continuously records wind speed and direction in the area of the composting activity. The device shall be capable of logging collected data for at least six months and shall be installed and be operational within three months of the commencement date of this consent.

The data shall be provided telemetrically to the Taranaki Regional Council. If this method is not technically feasible, the data shall be provided to the Taranaki Regional Council at a frequency and a form advised by the Chief Executive, Taranaki Regional Council until such a time it is technically feasible to telemetric the data.

Odour surveys

15. The consent holder shall undertake an odour survey within six months of the Plan approved under condition 9 of this consent being implemented and thereafter at yearly intervals during periods when metrological conditions are most likely to result in offsite odour. The methodology for the survey shall be consistent with German Standard VDI 3940 "Determination of Odorants in Ambient Air by Field Inspection", or similar. Prior to the survey being carried out, the methodology shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

The results of the survey shall be provided to the Chief Executive, Taranaki Regional Council, within three months of the survey being completed.

Community liaison

16. The consent holder and the Director – Resource Management, Taranaki Regional Council, or his delegate, shall meet locally as appropriate, six monthly or at such other frequency as the parties may agree, with submitters to the application of this consent and any other interested party at the discretion of the Chief Executive, Taranaki Regional Council, to discuss any matter relating to the exercise of this consent, in order to facilitate ongoing community consultation.

Incident notification

17. The consent holder shall keep a permanent record of any incident related to this consent that results, or could result, in an adverse effect on the environment. The consent holder shall make the incident register available to the Taranaki Regional Council on request.

Details of any incident shall be forwarded to the Taranaki Regional Council immediately. At the grant date of this consent, the Council's phone number is 0800 736 222 [24 hour service].

Site reinstatement

18. The consent holder shall prepare a Site Exit Plan which details how the site is going to be reinstated prior to the consent expiring or being surrendered. The Plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, at least 3 months prior to this consent expiring or being surrendered.

The Site Exit Plan shall address, but not necessarily be limited to, the following matters:

- a) How the site will be reinstated so that no raw materials listed or approved under condition 3 of this consent remain on site;
- b) How the site will be reinstated so that no partially decomposed material remains on site;
- c) How any remaining leachate or sludge, resulting from the operation, will be either removed from the site, buried, treated or otherwise to avoid any adverse effects on groundwater or surface water; and

Consent 5839-2

- d) Timeframes for undertaking the activities identified in association with a) to c) above.

Note: The requirement of this condition shall not apply if the consent holder applies for a new consent to replace this consent when it expires.

- 19. The consent holder shall reinstate the site in accordance with the Plan approved under condition 18 above prior to this consent expiring or being surrendered.

Review

- 20. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review within one month of approving the plan required under condition 9 of this consent and/or during the month of June in any year for any of the following purposes:

- a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to odour discharges from the site;
- b) To incorporate into the consent any modification to the operation and maintenance procedures or monitoring that may be necessary to deal with any adverse effects on the environment arising from changes in association with condition 9 of this consent; and
- c) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects of odour from the site.

Signed at Stratford on 27 May 2010

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Appendix 1 of consent 5839-2

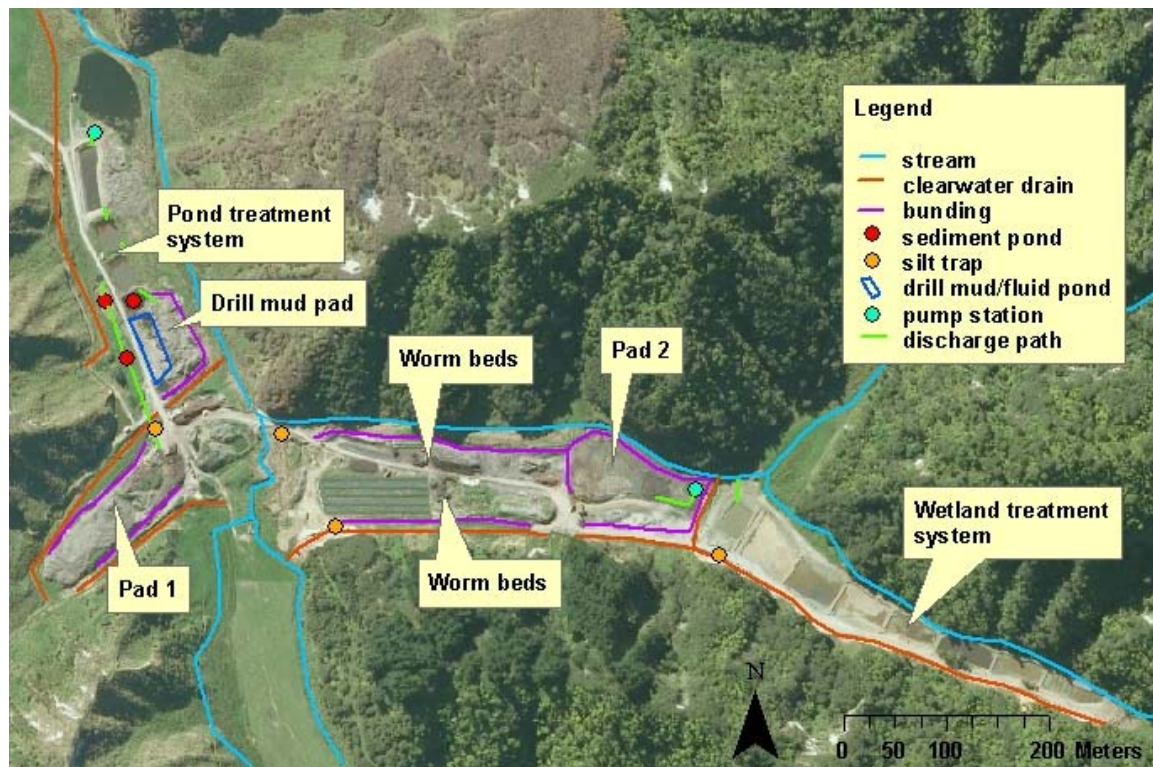


Figure 1 The location and extent of the composting operation including Pads 1 and 2.

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
PO Box 8045
New Plymouth 4342

Decision Date: 01 September 2015

Commencement Date: 01 September 2015

Conditions of Consent

Consent Granted: To use a twin culvert in the Haehanga Stream for vehicle access purposes

Expiry Date: 01 June 2033

Review Date(s): June 2021 and June 2027

Site Location: 1460 Mokau Road, Uruti

Legal Description: Sec 34 Pt Sec 4 Blk II Upper Waitara (site of structure)

Grid Reference (NZTM) 1731706E - 5685779N

Catchment: Mimi

Tributary: Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The consent holder shall ensure that the stream bed downstream from the structure is built up with appropriate material before 31 March 2016 to allow for fish passage and from this date forward the structure shall not prevent the passage of fish.
2. The consent holder shall maintain the structure so that:
 - (a) it does not become blocked and at all times allows the free flow of water through it;
 - (b) any erosion, scour or instability of the stream bed or banks is remedied by the consent holder.
3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and/or June 2027, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 01 September 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
P O Box 8045
NEW PLYMOUTH 4342

Consent Granted
Date: 26 September 2003

Conditions of Consent

Consent Granted: To realign and divert the Haehanga Stream in the Mimi catchment for land improvement purposes at or about (NZTM) 1732402E-5684777N

Expiry Date: 1 June 2021

Review Date(s): June 2009, June 2015

Site Location: 1460 Mokau Road, Uruti

Legal Description: Pt Sec 4 Blk II Upper Waitara SD

Catchment: Mimi

Tributary: Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General conditions

- a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

1. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.
2. The realignment authorised by this consent shall be undertaken generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.
3. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise erosion and scouring as a result of channel realignment.
4. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.
5. The consent holder shall ensure that the area and volume of riverbed disturbance shall, so far as is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.

Consent 6211-1

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2009 and/or June 2015, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 22 September 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
 P O Box 8045
 NEW PLYMOUTH 4342

Consent Granted 26 September 2003
Date:

Conditions of Consent

Consent Granted: To erect, place, use and maintain a culvert and associated
 structure[s] in the bed of the Haehanga Stream in the Mimi
 catchment for access purposes at or about (NZTM)
 1732402E-5684777N

Expiry Date: 1 June 2021

Review Date(s): June 2009, June 2015

Site Location: 1460 Mokau Road, Uruti

Legal Description: Pt Sec 4 Blk II Upper Waitara SD

Catchment: Mimi

Tributary: Haehanga

General conditions

- a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

- 1. The consent holder shall notify the Taranaki Regional Council in writing at least 48 hours prior to the commencement and upon completion of removal of the temporary culvert [being the 800mm diameter culvert] and installation of the permanent culvert and associated structures, and again at least 48 hours prior to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water.
- 2. The consent holder shall replace the existing temporary culvert with a permanent culvert and associated structure[s] by 1 April 2004. Prior to the installation of the permanent culvert and associated structure[s] the consent holder shall forward designs of the proposed culvert and associated structure[s] for the written approval of the Chief Executive.
- 3. The structures authorised by this consent shall be constructed generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.
- 4. The consent holder shall adopt the best practicable option to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.
- 5. The consent holder shall ensure that the area and volume of riverbed disturbance shall, so far as is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.
- 6. The structures, which are the subject of this consent, shall not obstruct fish passage.
- 7. The structures authorised by this consent shall be removed and the area reinstated if and when the structures are no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to structures removal and reinstatement.

Consent 6212-1

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2009 and/or June 2015, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 22 September 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Discharge Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation New Zealand
107 Corbett Road
Bell Block 4373

Decision Date: 09 March 2015

Commencement Date: 09 March 2015

Conditions of Consent

Consent Granted: To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

Expiry Date: 01 June 2033

Review Date(s): June 2021 and/or June 2027

Site Location: 1460 Mokau Road, Uruti

Legal Description: Sec 34 Pt Sec 4 Blk II Upper Waitara SD (Discharge source & site)

Grid Reference (NZTM) 1732059E-5684796N

Catchment: Mimi

Tributary: Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. This consent authorises the discharge of treated stormwater into an unnamed tributary of the Haehanga Stream, as described in the information provided with the application, and specifically:
 - a) The Assessment of Environmental Effects prepared by BTW Company Limited dated 9 January 2015; and
 - b) Additional Information prepared by BTW Company Limited dated 16 February 2015.

In the case of any contradiction between the details of information provided and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing, at least 48 hours prior to the exercise of this consent (including vegetation removal). Notification shall include:
 - a) the consent number;
 - b) a brief description of the activity consented; and
 - c) the extent or stage of the activity to be commenced.

Notification shall be emailed to worknotification@trc.govt.nz.

3. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
4. The consent holder shall operate and progressively reinstate the quarry site in a manner which ensures that the area of exposed, un-vegetated earth, within the quarry's stormwater catchment is kept to a minimum at all times.
5. The consent holder shall ensure that no area greater than 1 ha is exposed at any one time.
6. The stormwater discharged shall be from a catchment area not exceeding 4 ha.
7. This stormwater treatment system shall be installed before any site works commences.
8. The stormwater treatment system shall be maintained for the life of the quarry operation.
9. All stormwater shall be directed for treatment through the stormwater treatment system prior to discharge into the Haehanga Stream tributary.

10. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
total hydrocarbons	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

11. The pH may exceed 9.0 if the exceedance is a result photosynthetic activity within the detention ponds, but in any case the discharge shall not result in the pH of the receiving water increasing by more than 0.5 pH units after allowing for a mixing zone of 25 metres.
12. After allowing for reasonable mixing, within a mixing zone extending 500 metres downstream of any discharge point, the discharge shall not give rise to any of the following effects in the receiving waters:
- the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - any conspicuous change in the colour or visual clarity;
 - any emission of objectionable odour;
 - the rendering of fresh water unsuitable for consumption by farm animals;
 - any significant adverse effects on aquatic life.
13. After allowing for reasonable mixing, within a mixing zone extending 500 metres downstream of any discharge point, the discharge shall not give rise to any of the following effects in the receiving waters:
- an increase in the suspended solids concentration within the unnamed tributary of the Haehanga Stream in excess of 10 grams per cubic metres when the turbidity as measured immediately upstream of the discharge point is equal to or less than 5 NTU (nephelometric turbidity units); or
 - an increase in the turbidity within the unnamed tributary of the Haehanga Stream of more than 50%, where the stream turbidity measured upstream if the discharge is greater than 5 NTU, as determined using NTU (nephelometric turbidity units).
14. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

15. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:
- a) the loading and unloading of materials;
 - b) maintenance of conveyance systems;
 - c) general housekeeping; and
 - d) management of the interceptor system.

A Stormwater Management Plan template is available in the Environment section of the Taranaki Regional Council's web site www.trc.govt.nz.

16. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
17. This consent shall lapse on 31 March 2020, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
18. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and/or June 2027, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 09 March 2015

For and on behalf of
Taranaki Regional Council



A D McLay
Director - Resource Management

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
PO Box 8045
New Plymouth 4342

Decision Date: 02 March 2018

Commencement Date: 02 March 2018

Conditions of Consent

Consent Granted: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed

Expiry Date: 01 June 2033

Review Date(s): June 2021 and or June 2027

Site Location: 1460 Mokau Road, Uruti

Grid Reference (NZTM) 1732180E-5685096N

Catchment: Mimi

Tributary Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The culvert pipe shall be a smooth bore plastic pipe and have an internal diameter of no less than 1 metre and be no longer than 40 metres.
2. The fill over the top of the culvert pipe shall be comprised of suitable soils free of wood, humus and other organic matter. The embankment shall be well compacted in uniform layers not exceeding 300 mm loose depth to achieve a compaction of at least 95 % of maximum dry density.
3. The fill over the top of the culvert pipe shall be 2.3 m above the invert of the culvert.
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of work. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
5. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.
6. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by:
 - a) completing all works in the minimum time practicable;
 - b) avoiding placement of excavated material in the flowing channel;
 - c) keeping machinery out of the actively flowing channel, as far as practicable; and
 - d) reinstating any disturbed areas as far as practicable.
7. A reinforced concrete headwall shall be installed at the inlet to the culvert.
8. A layer of rock riprap 1000 mm thick shall be installed in the stream bed. The riprap shall extend 5 metres downstream of the culvert outlet and 1 metre up the banks on both sides of the stream. The rock shall have the following grading:
 - 100% less than 800 mm diameter;
 - 50% greater than 600 mm diameter;
 - 90% greater than 350 mm diameter.
9. The culvert shall not restrict fish passage.
10. The invert of the culvert shall be set below the existing stream bed by 200 mm so that it fills with bed material and simulates the natural bed.
11. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.

12. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical.
13. The culvert shall remain the responsibility of the consent holder and be maintained so that:
 - a) it does not become blocked, and at all times allows the free flow of water through it; and
 - b) the consent holder repairs any erosion, scour or instability of the stream bed or banks that the culvert causes.
14. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.
15. This consent shall lapse on 31 March 2023, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and/or June 2027, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 02 March 2018

For and on behalf of
Taranaki Regional Council



Director - Resource Management

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
PO Box 8045
New Plymouth 4342

Decision Date 24 June 2020

Commencement Date 24 June 2020

Conditions of Consent

Consent Granted: To realign a section of two unnamed tributaries of the
Haehanga Stream for land improvement purposes

Expiry Date: 1 June 2039

Review Date(s): June 2027, June 2033

Site Location: 1460 Mokau Road, Urenui

Grid Reference (NZTM) Between:
1731695E-5686147N & 1731840E-5686084N; and
1732341E-5685496N & 1732422E-5685525N

Catchment: Mimi

Tributary: Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. This consent authorises the permanent diversion of the full stream flow through two sections of reconstructed channel on two unnamed tributaries, between grid references:
 - (NZTM) 1731695E-5686147N and 1731840E-5686084N; and
 - (NZTM) 1732341E-5685496N and 1732422E-5685525N.
2. The new stream channels shall have a flow capacity no less than that of the existing stream channels.
3. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive'). Notification shall include the consent number, a brief description of the work, and the intended commencement date. Unless the Chief Executive advises that an alternative method is required this notice shall be served by completing and submitting the 'Notification of work' form on the Council's website (<http://bit.ly/TRCWorkNotificationForm>).
4. The consent holder shall take all practicable steps to minimise sedimentation and increased turbidity of the stream during the construction, implementation and maintenance of the works, including:
 - (a) completing all works in the minimum time practicable;
 - (b) avoiding placement of excavated material in the flowing channel; and
 - (c) keeping machinery out of the actively flowing channel, as far as practicable.
5. The channels shall be constructed to include sequences of runs and riffles that simulate the natural bed where the original stream bed is no longer present or stable.
6. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.
7. The consent holder shall prepare and implement a fish recovery plan that has been certified by the Chief Executive of the Taranaki Regional Council. The plan shall detail how the impacts on fish during culvert installation are avoided as far as practical, and shall include as a minimum how fish will be salvaged, how often fish will be salvaged, and recording the number and types of fish salvaged.
8. The new channel shall not restrict fish passage.

Consent 10825-1.0

9. At all times during the works the consent holder shall ensure that the stream flow downstream of the affected reach is not significantly diminished.
10. On completion of the realignment work:
 - (a) the banks of the reconstructed channel shall have a slope no steeper than 1.5 horizontal to 1 vertical; and
 - (b) the bed of the reconstructed channel shall be at an appropriate grade so as to provide for upstream fish passage.
11. The consent holder shall ensure that rock riprap is placed in the stream bed at all bends in the new channels. The riprap shall be placed within the entire bed width and up the banks of the new stream channel.
12. The rock riprap shall be no less than 0.9 metres thick, and of the following grading:
 - (a) 100% less than 600 mm diameter;
 - (b) 50% greater than 450 mm diameter;
 - (c) 90% greater than 200 mm diameter.
13. The consent holder shall maintain the realigned channel by repairing any erosion, scour or instability of the stream bed or banks.
14. The consent holder shall undertake and maintain riparian fencing and planting on the tributaries affected by the realignment, in accordance with the Riparian Management Plan for the property. An area of not less than 5 metres shall be planted between the stream bed and fence.
15. The fencing and riparian planting required in condition 14 shall be completed before August 2021.
16. To remedy and mitigate the adverse environmental effects of this consent, the consent holder shall establish and maintain riparian planting and a wetland as detailed in the 'Wetland Restoration Management Plan' provided with the application and attached as Appendix 1. The works shall be undertaken within the timeframes specified in that plan.
17. All earthwork areas shall be stabilised as soon as is practicable immediately following completion of soil disturbance activities.

Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Guidelines for Soil Disturbing Activities- Waikato Regional Council. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

Consent 10825-1.0

18. This consent lapses 5 years after its date of commencement, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
19. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2027 and/or June 2033, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 24 June 2020

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Appendix 1

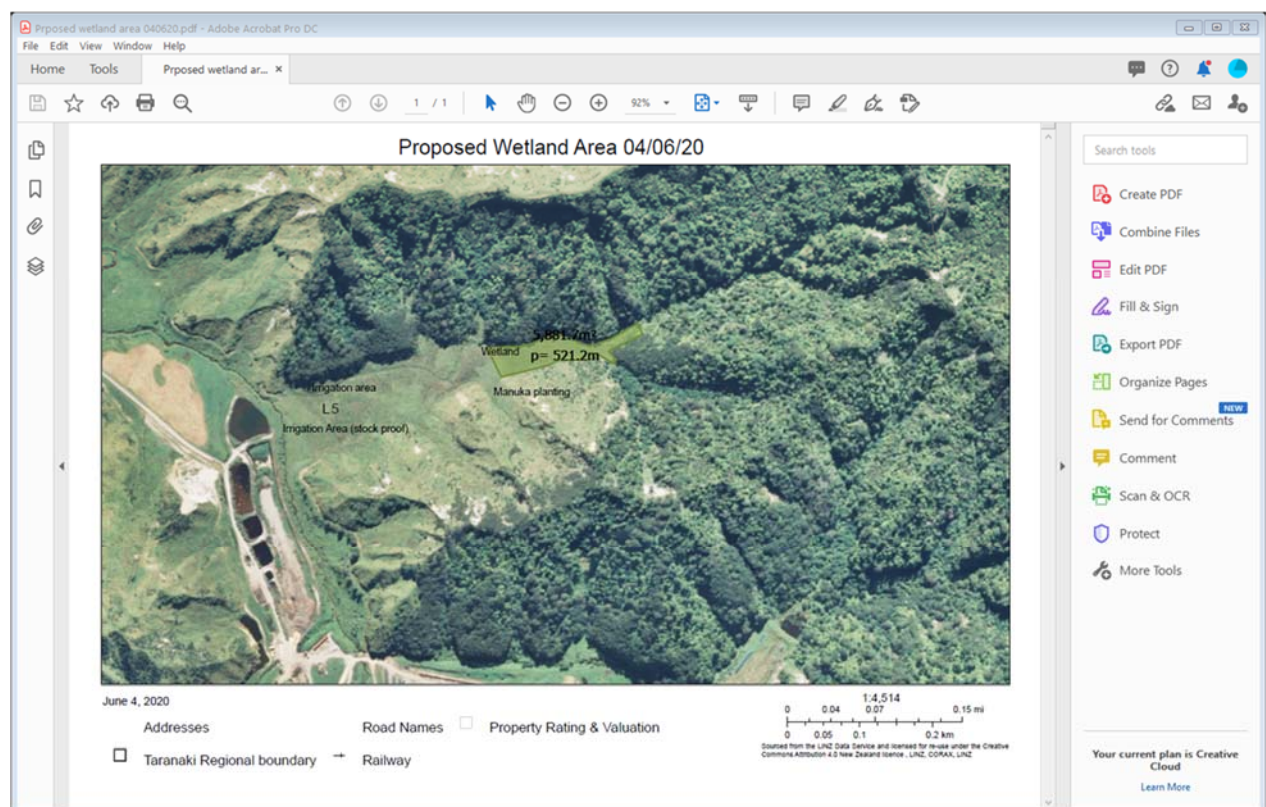
Wetland Restoration/Management Plan-Remediation (NZ) Ltd Uruti Site

13.1 Location

It is proposed to carry out a wetland restoration project on Remediation (NZ) Ltd land situated at 1460 Mokau Road.

The location of the proposed wetland is upstream of the L5 irrigation area. The wetland will have an approximate area of 0.588ha.

Diagram 1-Site of proposed wetland



Regenerative native bush is to the north and east of the proposed wetland. It is proposed to plant manuka on the southern hillside. To the western side of the proposed wetland is irrigation area L5.

The proposed wetland area has been grazed in the past and has little or no swamp vegetation. There is *Juncus* sp. growing in the wetland area.

It has been suggested by Sophie Arnoux (TRC Land Management Officer) that the proposed wetland area was likely to have been kahikatea/pukatea swamp forest (email dated 13/5/2020).

13.2 Description of water flow and drainage

There is a defined tributary of the Haehanga Stream to the west of the wetland. There is no defined stream through the wetland, with water flow either overland in periods of heavy rain, and underground during periods of no rain. Water seeps from the downstream bank that the wetlands have created which then forms the over ground tributary that runs between the irrigation area and bush margin.

13.3 Enhancement Proposal

It is proposed to replant the wetland area so as to re-create a kahikatea/pukatea swamp forest that would have been found in this area. Flax, cabbage tree, manuka and carex will also be planted. On the hill sides to the south of the wetland it is planned to plant manuka. The wetland and lower irrigation area will be fenced off summer 2020/21.

13.4 Plant numbers and plant spacing

The planting area is 5,880 m². Distance between plants will be 2 m. 5,880 divided by 2, divided by 2 again is 1,470 plants required to fill the area. There will be spacing of 1 m between sedges on the wetland margin.

Table 1: Planting

Location	Species	Spacing	Number
Centre area	Kahikatea	3 m	30 (year 3-4)
Centre area	Pukatea	3 m	30 (year 3-4)
Outer areas	Cabbage Tree	2 m	100
Outer areas	Flax	2 m	300
Outer areas	Manuka	2 m	500
Dispersed	Carex secta	1 m	150
Dispersed	Carex virgate	1 m	150

Plants will be sourced from local native plant nurseries, with planting out being carried out by Remediation staff. Weeding around plants will be carried out on an annual basis. Any regenerating native plants will be encouraged with these filling up the area.

13.5 Animal Pest Control

Goats and possums are the two pests that will need to be kept under control. Remediation has a contract with a goat culler to ensure the population of goats is kept under control. Possum traps will be set around the wetland area.

13.6 Timing

Ideally we would like to start planting this year. This may be flax and carex around the perimeter of the area. Planting of trees will occur in year 3 and remainder of planting in year 4.

Year 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pest Control									x			
Pre planting herbicide							x					
Planting								x				
Post planting release											x	

Year 2	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pest Control			x					x				
Pre planting herbicide				X								
Planting						X						
Post planting release											x	

Year 3	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pest Control			x					x				
Pre planting herbicide				X								
Planting						X						
Post planting release											x	

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: Remediation (NZ) Limited
PO Box 8045
New Plymouth 4342

Decision Date 24 June 2020

Commencement Date 24 June 2020

Conditions of Consent

Consent Granted: To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed

Expiry Date: 1 June 2039

Review Date(s): June 2027, June 2033

Site Location: 1460 Mokau Road, Uruti

Grid Reference (NZTM) 1731692E-5686143N

Catchment: Mimi

Tributary: Haehanga

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The culvert pipe shall have a diameter no less than 900 mm and be no longer than 10 metres.
2. The fill over the top of the culvert pipe shall be comprised of suitable soils free of wood, humus and other organic matter. The embankment shall be well compacted in uniform layers not exceeding 300 mm loose depth to achieve a compaction of at least 95% of maximum dry density.
3. The fill over the top of the culvert pipe shall be no less than 4 metres.
4. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive'). Notification shall include the consent number, a brief description of the work, and the intended commencement date. Unless the Chief Executive advises that an alternative method is required this notice shall be served by completing and submitting the 'Notification of work' form on the Council's website (<http://bit.ly/TRCWorkNotificationForm>).
5. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.
6. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by:
 - (a) completing all works in the minimum time practicable;
 - (b) avoiding placement of excavated material in the flowing channel;
 - (c) keeping machinery out of the actively flowing channel, as far as practicable; and
 - (d) reinstating any disturbed areas as far as practicable.
7. A layer of rock riprap 900 mm thick shall be installed in the stream bed. The riprap shall extend 3 metres upstream of the culvert inlet and 5 metres downstream of the culvert outlet and - up the banks on both sides of the stream. The rock shall have the following grading:
 - (a) 100% less than 600 mm diameter;
 - (b) 50% greater than 450 mm diameter;
 - (c) 90% greater than 20 mm diameter.

Note: The rock riprap shall be installed so that smaller grade rocks and gravels are placed within the larger rock to create a lasting stream bed appropriate for fish passage.
8. At all times after 1 May 2021 the culvert shall provide for fish passage.
9. The invert of the culvert shall be set below the existing stream bed by 225 mm that it fills with bed material and simulates the natural bed.

Consent 10843-1.0

10. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.
11. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical.
12. The culvert shall remain the responsibility of the consent holder and be maintained so that:
 - (a) it does not become blocked, and at all times allows the free flow of water through it; and
 - (b) the consent holder repairs any erosion, scour or instability of the stream bed or banks that the culvert causes.
13. This consent lapses 5 years after its commencement date (shown on the front of this document), unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period in accordance with section 125(1)(b) of the Resource Management Act 1991.
14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2027 and/or June 2033, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 24 June 2020

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Appendix II

Inspection notices

04 August 2020

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken as part of routine compliance monitoring. This was conducted in fine weather conditions with the Haehanga Stream in moderate to low flow for the time of year. All irrigation areas were well grassed and at a standard to be able to be used for the application of liquid wastewater. Irrigation wastewater had been applied to land in area L5 on the morning of the inspection. Although there was no sign of run-off, it was observed that there was some limited ponding on the surface.

The Site Manager was spoken to about this and advised to speed up the travelling irrigator to make sure that the irrigation wastewater was applied at a lighter rate. An inspection of the wetland treatment system (WTS) found that the final pond was full and discharging into the unnamed tributary of the Haehanga Stream. No foaming was observed at the discharge point and a slight discoloration was noted within the mixing zone. The Haehanga Stream however was observed to be clear below the lower extent of the paunch pond.

A concrete pad had been laid between pad 1 and the drilling mud pad. It was conveyed that if material was stored or dumped on the pad, all storm water from the pad should be directed to the treatment system and not allowed to discharge onto the clean areas on site.

A small number of riparian plants were noted at the site office. These will be planted in the coming weeks to continue the progress of riparian planting up the catchment.

It was also conveyed that all material deposited at the top end of the drilling mud pad be moved quickly onto the pad to make sure that no clean stormwater is contaminated. It was also conveyed to check all sediment ponds on site to make sure that they are cleaned to a standard required by condition 5 of this consent.

5938-2 *To use a twin culvert in the Haehanga Stream for vehicle access purposes*

An Inspection of the twin culverts found that they were free of blockages and/or obstructions with water flowing freely through both pipes. The riffles downstream of the culverts were in place and appeared to be working well to make sure that the static level within the Stream is sufficient to maintain fish passage. No signs of erosion were noted about the culvert.

5839-2 *To discharge emissions into the air, namely odour and dust, from composting operations*

In terms of the air discharge consent, an inspection was undertaken in fine weather conditions with 1/8 cloud cover and a light easterly wind. An odour survey was undertaken along the road boundary with no odours detected at any location. No odour was detected at the site office.

Odour was detected about the treatment ponds. At the time aeration was being undertaken in pond three. This was resulting in the minor emissions of odour, however it appeared that the main source of odour onsite is the material sitting within the drop off pit of the drilling mud pad.

This pit is large and difficult to keep empty. It was suggested that placing material straight into the composting process without letting it sit for extended periods within the drop off pit may help to control passive odour emissions from the site.

It may be worth considering whether reducing the size of the drop off pit may negate material remaining within the pit for an extended period of time, prior to composting on the drilling mud pad.

Options could also be explored to minimise passive odour emissions from the composting windrows especially those that are in the initial stages of the composting process on Pad 1. No odours were detected about the worm beds or paunch pond.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

The inspection found that the quarry was not in operation and had not been for some time. It was found that stormwater on the access track was being controlled via cut off drains, as well as a bund located at the base, to prevent sediment laden stormwater from discharging into the stream via overland flow from the base of the access track.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

The inspection of instream structures at the site found that fish passage was obtained by the culverts within the main stream. Further work is required about the culvert adjacent to the lower end of the worm beds to make sure that fish passage is maintained year round. Please provide a date by which this work will be completed.

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

The inspection found that the Haehanga Stream was in moderate to low flow through the section of realignment. No erosion or other issues were observed at the time of inspection.

6 August 2020

5939-2 To discharge emissions into the air, namely odour and dust, from composting operations

Odour surveys were undertaken at three locations in the vicinity of the composting site, Mokau Road, Uruti, in fine weather, with a very light north east breeze. The first odour survey was undertaken at 7.30am at the entrance to the Jones Quarry facility, 1320 Mokau Road, no odour was detected at this location.

The next odour survey was undertaken at the entrance to the compost facility on Mokau Road, no odours were detected beyond the boundary of the site entrance. .

The final odour survey was undertaken approximately one kilometre north of the composting site and no odour was detected at this location.

14 August 2020

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

An inspection was undertaken as part of routine compliance monitoring. The inspection was undertaken in fine weather conditions. The Haehanga Stream was in moderate to low flow conditions for this time of year. Inspection of the realigned section of stream found no signs or accelerated bank or headward erosion. A riparian planting plan going forward should include this area to be planted to assist with habitat improvement, shading and stabilisation going forward.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the culverts onsite found that all were open and free flowing. The culvert adjacent to the access track leading to the worm beds was free of blockages with water flowing freely through the culvert. The static water level through the culvert was sufficient to enable good fish passage.

As mentioned previously the large culvert beneath the access track leading to the worm beds requires remedial work to make sure that fish passage is maintained year round. This requires work to be undertaken to make sure that the static water level through the culvert is lifted/culvert lowered to make sure that the velocity through the culvert is similar to the stream within which it is placed.

The Regional Council records indicate that fish passage for this culvert has been an issue from time to time since 2007. Please advise of a works timetable in which this work will be completed.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection was undertaken during fine weather conditions, 10 degrees air temperature with 8/8 high cloud cover. A very slight easterly wind was noted at the site boundary.

An odour survey was undertaken on Mokau Road. At the time of the survey the traffic on the road was moderate with a number of large trucks travelling along it. This resulted in air disturbance about the survey locations. The odour survey did not detect any odours.

Upon entering site, a light 'musty' type odour was detected approximately 50m up the valley from the security gate. This was detected in line with the Haehanga Stream. This odour was not considered offensive due to its light and infrequent nature.

A light odour was also noted about the irrigation pond, however the main source of site odours were found to be about the drop off pit (associated with the drilling mud pad) which was found to be reasonably full and also immediately downwind of the composting wind rows on Pad 1.

No odours were detected about the worm beds or paunch ponds areas. No dust was noted discharging beyond the site boundary.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

The quarry was not in operation at the time of inspection and had not been used since the previous inspection. An inspection of the quarry area was not undertaken during this visit, however the access track was inspected to make sure that stormwater controls remained in place. Cut off drains

and bunds were in place to make sure that no stormwater discharged off the bottom of the access track onto the valley floor.

Please check the upper quarry site to make sure the exposed area is within resource consent conditions and if required please undertake any required re-vegetation activities to make sure this is achieved. Thank you

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken during fine weather conditions with the stream in moderate to low flow conditions for the time of year. Surface water sampling was undertaken throughout the site. In general the stream was found to be slightly turbid at the bottom site HHG000190 and cleared up as it progressed up the catchment.

No issues were observed at the sampling sites with regards to visual observations. No scums, sheens or foams were noted.

In general the inspection found the following; further riparian planting had taken place with plants observed leading up to the twin culvert. Plantings were observed immediately downstream and upstream of the twin culverts on the true right bank.

An inspection of the irrigation pond found that there was approximately 1 metre free board. Very little HC sheen was observed within the irrigation pond. It was also observed that the level of the duck pond had been lowered by approximately 1/2 meter.

The bund about the drilling mud pad was in place and the ring drain was working well by capturing and directing stormwater and leachate towards the irrigation pond. It was noted however that leachate was sitting within the ring drain at the lower end.

It would be beneficial to have this material discharge into the irrigation pond rather than sitting in the ring drain. This will move the stormwater into the appropriate area of the irrigation pond and not adjacent to the stream.

Good grass cover was observed across the irrigation fields, however it was noted that the irrigation field over the stream from the duck pond had some slips resulting in material blocking the drain on the upper side of the irrigation area. This will need to be cleared to make sure that the drain flows freely so that there is not a risk of overland flow in a concentrated path that could carry contaminants from the irrigation area into the stream.

It was advised that this work be completed prior to irrigating this area again. The upper irrigation area was found to be very damp, and although standing water was limited, the ability of the soil to uptake further irrigation liquid would be limited.

An inspection of pad 1 found no issues. An inspection of the drop off pit at the top of the drilling mud pad found that it had been 1/2 cleaned out. Sawdust and compost had been deposited at the top of the pad. When this occurs the material needs to be pulled onto the pad to make sure that stormwater is collected and directed.

At the time of inspection any stormwater from these piles would result in a discharge to surface water without appropriate treatment. This is undesirable.

The concrete pad between the drilling mud pad and pad 1 had been extended. Please note that anything stored upon the concrete pad or the wider laydown area should be clean, as it appears that the stormwater would not be directed to the irrigation pond from these locations.

An inspection of the worm beds found them all to be covered. Work is still required with regards to the sediment traps as was mentioned in the previous inspection.

The paunch pond was pumped down with approximately one metre free board. The top end of the paunch pond needs to be managed to make sure that a ring drain is maintained and stormwater/leachate can get to the pump. An inspection of the wetland found that it appeared to be operating well with a discharge rate of approximately one litre every four seconds.

During the sampling round it was observed that stock were fenced in a small area with open access to the upstream sampling sites. This should be discouraged and it was strongly recommended that the stock are excluded from the stream opposite the upper irrigation area.

Please note that the Nation Policy Statement for Freshwater Management 2020, Resource Management (National Environmental Standards for Freshwater) Regulations 2020 and the Resource Management (Stock Exclusion) Regulations 2020 are all operative in some part from 3 September 2020.

Among other things, these regulations restrict works around streams and wetlands while placing restrictions on the placement of weirs and culverts. Please make sure that you are familiar with these regulations going forward.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

The inspection of the twin culverts found that the headwalls were in place with no signs of erosion. The downstream riffles appeared to be secure and in place. It was noted however that the join within the culvert (mid culvert) had created a slight drop in the static water level. It was observed by looking up the culvert from the bottom end.

It was suggested that works will be required to slightly lift the static water level within the culvert, in order to remove the drop. This drop in water level may have developed via a slight movement of the culvert pipes, or the settling of the riffles which could cause the static water level through the culvert to slightly reduce.

18 September 2020

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

An inspection was undertaken to assess compliance with resource consent conditions. The inspection was undertaken following heavy rain immediately prior to inspection. The Haehanga Stream was discoloured (turbid) and slightly elevated upon observation on arrival to the site.

However, although the rain had ceased, the stream rose rapidly during the inspection. The Stream flow was approximately three quarters capacity flowing through the twin culverts on the property.

An odour survey was undertaken at the site boundary by State Highway 3. Wind conditions at the time of the survey were calm, however the wind began flowing up the valley once on site. No odours were detected at or beyond the site boundary. No odours were detected at the site office.

An inspection of the inwards goods drop-off area found that only acceptable material was observed being sawdust, sheep skins and dead chickens. A light sulphur odour was noted about the irrigation pond with other odours detected about the drop-off pit and pad one.

The odour being emitted from pad one appeared to be less than that observed during my previous visit to the site. During the inspection a load of compost material from pad one, being the sheep skin compost material was loaded into a truck and transported to the companies Cambridge facility to be utilised as compost for the market. No odours were detected about the worm beds or paunch pond.

During the inspection a series of BTEX passive absorption discs were deployed about the site. These will be active at the site for three weeks before being collected and analysed. The monitors were deployed at the following locations; at state highway 3 in the stock yard, adjacent to site office, below the duck pond, the southern end of the drilling mud pad and above the upper irrigation area.

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken following a period of heavy rain in which the Haehanga Stream was rapidly rising during the initial stages of the inspection. An inspection of the site included in installation of air BTEX monitoring devices (details which are included in observation for consent 5839-2).

An inspection of the irrigation areas found that no irrigation had taken place at the time of inspection, it is noted that this is in line with best practice due to the recent rainfall across the site. The travelling irrigator had been replaced with irrigation pods on the upper irrigation area. While the travelling irrigator is appropriate for the drier summer months, it was found that the application rate is too elevated for the wetter months. The irrigation pods allow the fluid to be applied at a lighter rate to minimise the chance of overland flow. The travelling irrigator will likely be used again in the summer months. Although the irrigation areas were wet underfoot there was no signs of overland flow from the previous application of irrigation fluid across these areas.

An inspection of the paunch pond and associated wetland treatment system found that the paunch pond level was at a reasonable level with ample free board to store further stormwater during a wet period. The wetland was discharging at a high rate, however it is likely that a majority of the liquid was stormwater. Very limited foaming was noted at the discharge point. This did not extend into the unnamed tributary of the Haehanga Stream.

An inspection of the unnamed tributary of the Haehanga Stream found that there was no visual effects as a result of the discharge within or below the mixing zone. At the time of inspection, a load of sheep skins were delivered to Pad 1. A load of greenwaste was also at Pad 1 ready to be mixed

with the skins. It was advised that when this blending process is undertaken for the recent delivery, that the small pile adjacent to this delivery is also mixed and covered.

These were also some skins that had recently been received at site, and although they had been mixed with greenwaste it was found that some remain exposed and required better blending to make sure a good cover is obtained. A load of composted skins were also removed from site, which were proposed to be sent to the Cambridge facility for use.

An inspection of the drilling mud pad found that the drop-off pit contained less product than observed on other inspections. The solids pile had been pulled back from the top end of the pad, this allowed room about the pile to make sure storm water collected in this area was easily directed into the ring drain and irrigation pond.

The irrigation pond was half full on observation. Some additional work was proposed to make sure that the stormwater from the drilling mud pad is directed into the irrigation pond and does not sit within the ring drain. This had been discussed with site management, on site.

It was also discussed on site about removing a top portion of the compost off the drilling mud pad at the bottom end. This product will be placed into a windrow and tested, to assess the material against the previously agreed surrender criteria. If product is removed from this pad it needs to be stored in an appropriate location where all stormwater is collected and directed to the pond system. The wind row needs to be clearly identified as material originating from the drilling mud pad to make sure that it goes through the appropriate treatment and testing criteria.

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

An inspection of the re-aligned section of stream found that the stream was in fresh with the lower sections of the banks submerged. An inspection during these conditions found that the realignment was open with water flowing unobstructed with no obvious signs of accelerated erosion of the banks observed. No issues were identified during the inspection, noting that the stream was in fresh at the time and therefore a more detailed low flow inspection was not possible. Thank you

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the culvert under the access track leading to the worm beds found that it was approximately flowing at 60% capacity. On visual inspection there were no signs of blockages or obstructions with no signs of accelerated erosion about the culvert during these high flow conditions. No issues were identified during the inspection, noting that the stream was in fresh at the time and therefore a more detailed low flow inspection was not possible.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

An inspection of the quarry site found that it remains unused. The stormwater controls on the access track remain in place and no sediment laden storm water was observed discharging from the base of the access track.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

An inspection of the twin culverts found that they were full and flowing near capacity. No blockages and or obstructions were observed with the Haehanga Stream flowing reasonably evenly through both culverts. No issues were identified during the inspection, noting that the stream was in fresh at the time and therefore a more detailed low flow inspection was not possible.

14 October 2020

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken as part of routine compliance monitoring. It was conducted in fine weather conditions with little wind and no cloud cover. The Haehanga Stream was slightly elevated and swift following a fresh earlier in the week. No one was on site at the time of the inspection. A full surface water sampling run was undertaken as part of the inspection.

The inspection found that no irrigation was taking place at the time. The irrigation areas had good grass cover and were damp but not sodden, with no signs of overland flow from these areas into surface water.

An inspection of the wetland found that it was discharging into the receiving environment from the final pond. The discharge was a tannin colour and no foaming or odour was detected as a result of the discharge. It was observed that the receiving environment (unnamed tributary of the Haehanga Stream) that flows adjacent to the wetlands and the paunch pond was very turbid.

This turbidity was traced into the upper catchment where only native vegetation is present. It is believed that the source of the sediment is from a slip or other natural occurrence in the upper catchment within the dense bush.

An inspection of the paunch pond found that there was sufficient free-board to contain further stormwater. All worm beds were covered on both pads. All stormwater from pad 1 and pad 3 were being captured and directed to the treatment ponds and irrigation pond. The irrigation pond had approximately 0.5m free board. However, work was still required to better manage the collection of stormwater within the ring drain at the lower end of pad 3.

It was noted during the inspection that greenwaste appeared to be being stored on the concrete pad adjacent to pad 1. Leachate was observed tracking across the concrete towards the clean stormwater collection area.

In a meeting at Regional Council with the Council's Compliance Manager and Remediation New Zealand this issue was discussed and it was confirmed that no material would be stored on the concrete pad and that all material would be stored on pad 1 or three.

On leaving the site it was observed that an Intergroup 'sucker truck' was departing the site. This truck had delivered a load of sludge and waste oil into the drop-off pit at pad 3. On speaking with the Regional Council Environmental Scientist it was confirmed that this was not on the accepted goods list and no authorisation was sought to receive this material.

In addition, the storage of greenwaste on the concrete pad is in contravention of special condition 6, while the acceptance of waste oil into the drop-off pit on site is in contravention of special condition 2. An explanation of these issues will be sought.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the culvert under the access track to the lower worm beds and the smaller culvert adjacent to this point found that both culverts were open and free of any blockages and/or obstructions.

No erosion was noted about either of the culverts. Fish passage is in place for the culvert running adjacent to the track while further work is required on the main culvert. Photographs were taken.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection undertaken in fine weather conditions, 11 °C with no cloud cover. The weather conditions were sunny and dry with very little wind. Wet weather was recorded at the site on the 12 October 2020.

An odour inspection was undertaken along the property boundary adjacent to State Highway 3. No odour was detected at or beyond the site boundary. No odour was detected about the site office or further up at the twin culverts.

A sulphur odour was detected about the irrigation pond. No odours were noted about pad 3, however the usual offal type odour was detected about the drop off pit adjacent to the drilling mud pad.

As recorded in the comments for resource consent 5838-2.2, it was observed that waste oil had been dropped off into the drop off pit by Intergroup. This material was not authorised under resource consent conditions (special condition 3 of this consent). Please note that the acceptance of this product has resulted in a non-compliance with both this consent and consent 5838-2.2.

10063-10 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

An inspection of the quarry at the RNZ facility found that it had not been operational for an extended period of time. The exposed surfaces were beginning to naturally grow vegetation including the access track.

The cut off drains and bund at the base of the access track remain in place to prevent stormwater flowing down the access track and out onto the lower site track at the stream crossing. No issues were identified at the time of the inspection.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

At the time of the inspection the stream was flowing swiftly and slightly elevated. Inspection of the twin culverts found that both culverts were free of blockages and/or obstructions with water flowing freely through both culverts.

The rock riffles installed at two locations downstream appeared to be in place and working well to lift the static water level to make sure that fish passage through the culverts was maintained. No issues were identified at the time of inspection.

04 November 2020

5839-2

During a review of the inwards goods register submitted to Regional Council by the Company at 08:50 am on 3 November 2020 it was found that a delivery recorded in row 44 of the spreadsheet was detailed as; 14/10/2020, 11.10am Intergroup Grease Traps 16451 Intergroup 3.66.

In accordance with resource consent 5839-2, special condition 3 refers to Grease trap waste specifically as 'Grease trap waste [from food service industries]. The related site inspection undertaken on 14 October 2020, and the subsequent enquiries recorded that the product deposited at the facility, as detailed in weighbridge docket 16451, was described as waste oil/sludge originating from a clean out of the waste oil storage facility at the Hawera Transfer Station.

The recording and subsequent submission of inaccurate data is non-compliant with special condition 5 of resource consent 5829-2. Further follow-up will enquiries will be undertaken.

18 November 2020

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

The inspection was carried out during wet weather conditions. An inspection of the realigned section of Haehanga Stream found it slightly elevated and flowing reasonably swiftly.

No signs of blockages or obstructions were observed within the section of stream. No accelerated erosion was observed and no obstructions to fish passage was observed detected. No issues identified at the time of inspection.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the culvert found that the Haehanga Stream was flowing through the culvert, it was described as swift and elevated in flow. It was difficult to assess fish passage with the stream being so elevated in flow.

The culvert was free of any blockages and or obstructions. No erosion was noted about the structure, the headwalls appeared stable and secure.

It was communicated that an inspection will be undertaken in fine weather conditions to make sure that fish passage is maintained during low flow conditions. Should it be determined that fish passage is not provided for then an abatement notice will be issued.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection was undertaken in overcast weather conditions with 8/8 cloud cover. Upon arrival at the site the weather was 18°C and dry with a light swirling breeze. An odour survey was undertaken at the property boundary with the Mokau Road/ State Highway 3. The odour survey was undertaken during fine weather conditions, however rain quickly set in and the site inspection was undertaken during wet weather conditions.

No odours were detected at the site entrance, site office or twin culverts. A cold air drainage bund had been constructed along the rear of the site office between the office and Mokau Road/ State Highway 3. This had been planted out and grassed.

The earth to construct the bund was extracted from the hill adjacent to the bund and access track. Although a bund had been created, the location where the earth was extracted created a larger gap at the site access track.

At the time, the bund was limited in height and its effectiveness could not be assessed. Some odours were detected about the irrigation ponds, drop off pit and pad 1. Minimal odour was noted from pad 1.

An inspection of the drop off pit found no signs of unauthorised materials deposited at the site. No changes to the management of the odour sources were observed, in order to minimise the generation of odour at the site. Please be aware that works are required to make sure of compliance with the recently issued abatement notice.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

The inspection found that the quarry was not in operation and had not been accessed for some time. The access track was beginning to grow grass in places. The cut off drains remained in place and the bund at the base of the access track was still in place, to make sure that all stormwater was directed through the grass margins and not allowed to discharge out the base of the access track and into the stream. It was recommended that the lower bund be reshaped again. It was suggested that the bund be compacted to no less the 400 mm in height.

5838-2.2 To discharge:

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

An inspection of the Uruti composting facility was undertaken as part of routine compliance monitoring, during wet weather conditions. The Council's biologist was also onsite, he was joined by Ngati Mutunga's Environmental representative Marlene Benson and Fresh water expert Kate McArthur Kelby (TRC) as part of the ongoing resource consent application process. On this day the Council's biologist and Ngati Mutunga were viewing the surface water and biological monitoring

locations. They were also to identify a new reference monitoring location for the biological survey, which was planned to be undertaken in a couple of months' time.

The inspection found that no irrigation had taking place at the time of the inspection. Some earthworks had been undertaken to realign a section of stream in the lower valley (as authorised by resource consent). These would be followed by earthworks to create a new irrigation area.

It was advised that there was no resource consent to authorise the earthworks and therefore all works, including the volume of material moved, exposed area and discharge parameters (among others) must be complied with in accordance with the permitted activity rule of the Regional Freshwater Plan for Taranaki. The newly constructed channel would be assessed upon completion, to make sure that it meets all conditions of the resource consent before water could be introduced into the channel.

An inspection of the duck pond found that there was sufficient free board to address any increase in water level during a wet weather event. This would make sure that there was no overflow into the stream, as such, an overflow is not permitted due to the level of contamination within the pond.

An inspection of the irrigation pond found very minimal sheen on the pond. The pond had approximately 0.3 -0.5 meters free board. The ring drain about the drilling mud pad was inspected. This ring drain was required to be redefined and cleaned out along its entire length to make sure that all stormwater was captured and directed to the irrigation pond for storage before being applied to land. While the ring drain was in place and working well it had been gradually silting up and therefore the cleanout is a maintenance issue.

Please note, as had been discussed with David Gibson on site on two occasions, the ring drain should capture and direct stormwater to the irrigation pond for holding. Stormwater (under BPO) should not be allowed to be held within the ring drain.

Currently, likely due to previous de silting, the bottom end of the ring drain was holding standing stormwater. This was required to be address by either lining the area with an artificial liner, or addressing the levels to make sure that there was no pooling and/or ponding within the ring drain.

The treatment ponds leading to the irrigation pond are also required to be cleaned out again as they were beginning to silt up. The area about the drop-off pad appeared to be reasonably clean, however attention was required to be given to make sure that this area continued to be kept clean. This included the concrete pad, as poor management could quickly result in this area becoming contaminated.

Pad 1 was well defined with a ring drain. Please make sure that as work is undertaken in this area, stormwater is not allowed to collect and sit anywhere within the pad, as it is not designed for this function. All stormwater must be held within the pond treatment system and associated irrigation pond.

The wormbeds were inspected and all were found to be covered. Please make sure the sediment pits are installed and maintained in accordance with special condition 5 of this resource consent. This issue was brought to your attention in the inspection notice issued on 04-08-2020 and therefore must be given effect to.

An inspection of the paunch pond found that there was reasonable free board, however the management of this area appears to be slipping with a gradual increase in the pond level noted over recent inspections. This area and the associated wetland treatment system should be managed to

minimise the volume of stormwater sitting within the paunch pond while allowing for the pumped stormwater to be treated to a good standard within the wetland treatment system.

Consideration should be given to reducing the footprint of the paunch pond and therefore reducing the catchment area and associated volume of stormwater that is collected and required to be treated. Due to the general expansion of the site (wormbeds placed adjacent to the paunch pond and the construction of new irrigation areas) a conversation will be held with Nathan Crook as to whether further surface water sampling points are required.

In general the inspection had identified work that was required to be completed to make sure of compliance with resource consent conditions. These included the following:

Make sure fish passage was maintained through the culvert below the access track to the worm beds.

Rebuild the bund at the base of the access track to the quarry.

Clean out the ring drain about the drilling mud pad and address the pooling issue within the ring drain at the base of the pad.

Clean out sediment ponds within the pond treatment system.

Redefine the sediment traps to a standard at or better than that stipulated by resource consent conditions (information previously provided).

Make sure that actions are taken to make sure ongoing compliance with Abatement Notice that are in place for the site.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

The inspection of the twin culverts was undertaken during wet weather conditions. The inspection found that the stream was slightly elevated at the time of the inspection. An inspection of the culvert and associated riffles found that all structures were in place with the riffles working well to increase the static water level throughout the culverts.

The culverts were free from blockages and obstructions and no barriers to fish passage were observed. No accelerated erosion was noted about the culvert and its associated headwalls. No issues were identified at the time of inspection.

11 December 2020

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

The inspection was undertaken in fine weather conditions following an extended period of heavy rain in the preceding days. As a result, the streams throughout the property were elevated and swift, however were decreasing in flow from what had occurred over the previous days.

An inspection of the realignment found that stock are excluded from the stream and the banks within the realignment. The banks were well grassed with no signs of erosion of the bed or banks.

No obstructions were observed or blockages and no fish barriers were noted. No issues identified at the time of inspection.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the culvert found that the water flowing through the culvert was elevated and swift. There were no blockages or obstructions within the culvert and the headwalls were in place and sound, with no signs of accelerated erosion about either end of the culvert.

Due to the river conditions it was not possible to determine fish passage through the culvert, therefore that specific condition was not assessed at the time of inspection. The concern is that the water flowing through the culvert and the shoot on the lower side of the culvert will make it difficult for fish to pass through the culvert.

To follow on from a previous inspection notice, I will arrange for a freshwater biologist to visit the site in early 2021 to determine fish passage through this culvert.

If the freshwater biologist determines that fish passage is not provided for then an abatement notice may be issued to make sure that such passage is provided for.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

At the time of inspection the air temperature was 18°C with 7/8 cloud cover (high cloud). A very light northerly wind was detected at the property boundary with Mokau Road. The ground was dry and a reasonable volume of traffic was observed on Mokau Road.

An odour survey at the site entrance and along the property boundary, accompanied by a Regional Council summer student, did not detect any odours emanating from the composting facility. In general no odours of any description were noted about the property boundary.

No odours were detected at the site office or at the twin culverts. A very light sulphur type odour was detected about the irrigation pond, which was being aerated at the time of the inspection. No odours were detected about pad 1, however the drop-off pit was odorous and the main source of odour at the time of the inspection. During the inspection the wind changed and was blowing up the valley. Odour could then be detected from the lower end of the upper irrigation area. An inspection of the drop off pit found that only authorised material had been deposited at the site.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

An inspection of the quarry found that it was not operational and had not been used for some time. The cut-off drains for the access track were in place and were observed to be functioning through the diversion of stormwater off the track. The bund at the base of the access track remained in place, however it may require additional work so that it continued to function as designed.

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken in fine weather conditions following an extended period of heavy rain in the preceding days. As a result, the streams throughout the property were elevated and swift, however were decreasing in flow.

The inspection found that the drilling mud pad was banded with material held on the pad. A slip of material had occurred during the recent rainfall event. This had resulted in some of the material slipping towards one of the treatment ponds within the banded area. The material remained within the banded area. It was communicated that it would be pulled back on to the pile once it had dried out somewhat.

The irrigation pond was full with the aerator in operation at the time of inspection. It was communicated that the irrigation will recommence once with ground is suitable again. The drop off pit was approximately half full with no signs of unauthorised material within the pit.

The worm beds were covered with no signs of discharge from the general area. The paunch pond was reasonably full. It was advised that this area needs to be monitored to make sure that all stormwater is tracked across the pond towards the upper end where the pump is located. As the paunch is wet upon delivery, it can create a wall of material as it settles out and prevents leachate/stormwater from accessing the wider pond. This aspect needs to be monitored and channels need to be kept open.

Please also make sure the sediment ponds, as detailed in the Appendix to the resource consent, are cleaned out and re-established. No pumping to the wetland treatment system was observed at the time of the inspection, however the treatment system was discharging. Samples were taken of the wider receiving environment to assess compliance with resource consent conditions.

5938-2 *To use a twin culvert in the Haehanga Stream for vehicle access purposes*

At the time of the inspection, the Haehanga Stream was flowing freely and evenly through the twin culverts. The culverts were free of blockages and obstructions. No signs of erosion about the culvert and no obstructions to fish passage were observed. No issues were identified at the time of inspection.

11 January 2021

5839-2 *To discharge emissions into the air, namely odour and dust, from composting operations*

A site visit/inspection was undertaken as a result of an odour incident in the early hours of 11 January 2021. It was also to confirm the source of the odour detected that morning. The Officer was accompanied by the Company General Manager for the duration.

The investigation found odour emanating from the composting facility irrigation pond and associated ponds. It was deemed similar to the odour detected beyond the site boundary of the composting facility.

The odour which had been detected beyond the site boundary, was considered to be offensive and objectionable. An infringement notice was issued as a result of the non-compliance with special condition 13 of resource consent 5839-2 and 15(1)(c) of the resource management act 1991.

2 February 2021

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

A pro-active inspection was undertaken post a complaint received on 01/02/2021 from a member of the public regarding an offensive odour emitting from the Company site at Uruti. The inspection found there was no objectionable or offensive odour noted at the site entrance or beyond.

There was a very weak compost odour detected at the site entrance which was not detected beyond that point. At the time of inspection the consent holder was compliant with consent conditions.

05 February 2021

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

An inspection was undertaken in accordance with routine compliance monitoring. The inspection found that the realigned section of stream was stable with well grassed banks. No accelerated erosion was noted and fish passage was provided for throughout the realignment. No issues were identified at the time of inspection.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection was carried out during a period of fine weather. The Haehanga Stream and associated unnamed tributaries on the property were in low flow conditions with little flow passing through the culverts on site.

An inspection of the culvert found that it was open and free of any blockages and/or obstructions. The stream was flowing freely through the culvert. Headwalls were inspected with no erosion noted about the headwalls or in the general vicinity of the culvert.

It was noted that work had been undertaken on the downstream side of the culvert to lift the static water level through the culvert to better allow for fish passage. This was difficult to assess with the current low flow and will be re-assessed once the flows increase. If further works are required, rocks are stored on site to allow this work to be undertaken.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection was undertaken in fine weather conditions. At the time of inspection the air temperature was 21°C with 0/8 cloud cover. There had been no rainfall in the days preceding the inspection.

The road surfaces and access tracks were dry and a light to moderate south-east wind was noted at the State Highway/ Mokau Road. An odour survey was undertaken along the property boundary with Mokau Road. No odours were detectable in this general area. A further survey was undertaken about the site office within the boundary of the facility. No odours were noted about this location.

The area about the twin culverts was also free of any odour associated with the activities at the facility.

No irrigation was taking place at the time of the odour surveys, however by the conclusion of the inspection the irrigation pond was being aerated and irrigation activities were taking place on the irrigation field immediately below the duck pond.

An inspection about the irrigation pond detected a light sulphur odour. An inspection of the drop off pit found that the pit had plenty of capacity within it, with small volumes of product within the pit. Although odour was noticeable about the drop off pit, this odour was much reduced compared with previous inspections.

A walk over the drilling mud pile found no odour detectable across the majority of the pile, however light odours were detected near the operational end of the pile. Note this is where the fresh product is placed. This was deemed light in nature.

The chicken carcasses were being delivered to pad 1 onsite and incorporated with green waste and then shaped into wind rows on the pad. This is change, as up until recently the carcasses were discharged into the drop off pit and then wedge piled onto the drilling mud pad.

All worm beds were covered on site with no odours detected about the beds. Some odour was detected about the paunch drop off area. Overall, the inspection across the facility found that the main sources of odour were emitted from the irrigation pond and associated treatment ponds extending up to the drop off pit. No odours were detected at or near the property boundary.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

An inspection of the quarry on site found that it had not been used for an extended period. The cut off drains and bunds remained in place on the access track and the vegetation is beginning to grow in spots as a result of the site not being operational.

No issues were noted during the inspection, however some maintenance works would be required if the site were to become operational again, as the risk of sediment mobilisation would increase should extraction activities recommence.

5838-2.2 To discharge:

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken in fine weather conditions. At the time of the inspection the streams on the property were running low with some of the tributaries on the property found not to have any visible flow. The inspection found that works were being undertaken to establish another irrigation area adjacent to the site office. This work involved the realignment of an unnamed tributary of the Haehanga Stream and the installation of a culvert (both under resource consent).

Earthworks for the establishment of this irrigation area were being carried out under the RFWP - permitted activities. It was conveyed to make sure that the terms and conditions of rule 26 are complied with.

An inspection of the wider site found that all irrigation areas were well vegetated and dry underfoot. During the inspection irrigation commenced on the irrigation paddock immediately below the duck pond. Waste water was being applied to this area via stationary irrigators. During this time the irrigation pond was also being aerated. The inspection found that the duck pond was reasonably full.

An inspection of the drilling mud pad found that the ring drain was open and stormwater was able to collect and flow to the irrigation pond for storage before being applied to land. It was noted that stormwater was ponding within the ring drain at the lower end, adjacent to the duck pond.

A conversation was held onsite and it was requested that works be undertaken to make sure that all stormwater was directed to the irrigation pond and not held within the ring drain. The Site Manager was to look at what options are available to make sure that this occurs.

At the time of inspection the irrigation pond had approximately 0.5m of free board. No hydrocarbon sheen was observed within the irrigation pond. An inspection of the treatment ponds found that they were largely free of solids. The drop off pit was low with much less product held within the pit than previously observed. Some product was being placed into the pit and subsequently onto the drilling mud pad, however at the time of the inspection it was found that the sheep skins, green waste and chicken carcasses were all being mixed and wind rowed onto pad 1.

Work was being undertaken to lift the base of pad 1. This work was aimed at separating the compost from the stormwater and to allow the stormwater to flow off the area, into the ring drain and to the irrigation pond. This work was ongoing and progressed when the compost rows are moved.

An inspection about the worm beds found that all the beds were covered. The sediment ponds about the lower worm beds have been cleaned out as requested. Works had been undertaken about the drop off area of the paunch pond. This involved building up and increasing the turning area adjacent to the ponds for the delivery trucks. The bund wall in this area had also been lifted with the intention of lifting the pond wall throughout the length of the pond adjacent to the unnamed tributary of the Haehanga Stream.

At the time of the inspection the paunch pond had approximately 0.5 - 0.75m of free board. Stormwater was being pumped from the pond and into the top of the wetland treatment system.

Due to the extended dry period the wetland treatment system was not discharging and was below the discharge point. The Company were managing the system by pumping stormwater into the treatment system at a rate that allowed the liquid to evaporate and/or be taken up by the plants within the system without discharging into the receiving environment.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

The inspection was carried out during a period of fine weather. The Haehanga Stream on the property was in low flow conditions with little flow passing through the culverts on site. An inspection of the twin culverts found that they were free of any blockages and/or obstructions with water flowing freely through both culverts. The static water level was sufficient through the culverts to allow for fish passage (approximately 5cm of water depth with very low velocity).

An inspection of the head walls found no signs of erosion or other structural failures. An inspection of the two downstream riffles, that were installed to lift the static water level, found that they were both in place, secure and working well. There were no signs of erosion about these two structures. No issues were identified with the twin culverts as a result of the inspection.

22 February 2021

5839-2

A proactive inspection was undertaken following two phone calls received at the call centre regarding the deodoriser and odour emitting from the Company site, outside the hours of 6am - 6pm over the weekend.

Odour surveys were undertaken at the site entrance, south of the site entrance and 1358 Mokau Road, Uruti. No odour was detected at any of these locations.

24 February 2021

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

A proactive inspection was undertaken to monitor compliance with resource consent conditions. No odour was detected at Remediation (NZ) Ltd site entrance or beyond the boundary. At the time of inspection all consent conditions assessed were compliant. No further action required.

25 February 2021

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

An inspection of the realigned section of the Haehanga Stream found that it appeared (on visual inspection) to be stable with no signs of erosion about the banks or bed. The stream flowing through this section had largely ceased, with only a very small flow through the bed material detected. No issues identified at the time of inspection.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An assessment of the culvert beneath the track leading to the worm beds found that it was free of blockages and/or obstructions, allowing the stream to flow unobstructed through the culvert. The headwall was stable showing no signs of erosion or failure.

Works had been undertaken to lift the static water level through the culvert. Although this appears to have worked to some degree it is likely further work may be required in the coming months.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection was undertaken in dry weather conditions. All surfaces were dry, 23°C air temperature with no wind and 1/8 cloud cover. An odour survey was undertaken at the property boundary both above and below the State Highway Bridge. No odours were detected off site.

An inspection about the site office and twin culverts found no odours from site operations. An inspection about the irrigation pond found that the usually noted sulphur type odour was not detectable.

This may well be due to a few factors, low levels within the irrigation pond, the aeration of the irrigation pond, or the reduction in liquid waste being received at the site.

An odour was noted about the drop off pit adjacent to the drilling mud pad, and a slight odour was detected about the composting windrows, however, both of these odours were light in nature and rated below the usual odour intensity that is noted about these areas.

It is worth considering if the treatment ponds between the irrigation pond and drop off pit are still required considering that drilling waste and other liquid waste from the drilling industry is no longer being processed at the facility.

These ponds are considered a source of passive odours emitters on the site and therefore if they are not required, they could be filled in.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

The inspection found that the quarry was not in operation and had not been use since a brief stint the previous summer. As such all stormwater controls (cut off drains) remained in place with vegetation establishing on exposed areas.

5838-2.2 To discharge:

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken in fine weather conditions (23 °C air temp, nil wind and 1/8 cloud cover). At the time of the inspection, the ground was dry and soil over the irrigation areas was hard. The Haehanga Stream was in low flow conditions with some of the tributaries not following.

The inspection found that works were continuing on site to construct the new lower irrigation area. This area needs to be completed and seeded as soon as possible to control potential sediment discharges during rainfall events.

An inspection of the irrigation pond found that it was low in level, with ample free board available to store any in-flow stormwater during a wet weather period. The irrigation pond was also being aerated at the time of inspection.

A walk around the solid drilling mud pile found that the ring drain was in place with all stormwater from this area being captured and directed to the irrigation pond. This fluid would be applied to land

when conditions are appropriate. Most operations appeared at the time to be taking place on the composting pad 1 with the use of the drop off pit at the drilling mud pad greatly reduced.

The composting pad 1 was well defined to make sure that all stormwater is captured, controlled and directed to the irrigation pond. Works were being undertaken to lift the height of the composting pad to make sure that the windrows were kept elevated and stormwater was quickly removed from the area.

The worm beds were covered and an inspection of the paunch pond found that the water level was down compared to previous observations, with regular pumping to the wetland treatment system. Regular limited pumping to the wetland treatment system allowed the wetland to absorb the stormwater while ensuring that there was no discharge from the system, while the Haehanga Stream and associated tributaries were in low flow conditions. No discharge from the wetland treatment system was observed during the inspection. Samples were taken of the surface waters to assess compliance with resource consent conditions.

It was suggested to consider cleaning out the truck wash retention pond as it appeared full of solids. When this it is cleaned out it is suggested to please make sure that the cleanings are moved to the drilling mud pad for composting, due to the likely contamination of the material within the pond. As drilling mud was no longer accepted at site it was suggested whether the treatment ponds between the drop off pit and the irrigation pond were still required. These ponds are a likely source of passive odours and cleaning them out and filling them in may assist in reducing odour generation at the site.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

At the time of the inspection the stream was in low flow conditions with very limited flow through each of the twin culverts. An inspection below the twin culverts found that the two riffles were in place and working as designed, to lift the static water flow through the culverts. The flow rate was so and appeared to be about 2cm of flow depth through the culverts. The headwall about the entry and exit of the culverts were sound and secure with no signs of erosion. No issues identified at the time of inspection.

12 March 2021

5838-2.2 To discharge:

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

A limited sampling run was undertaken at the Uruti composting facility in response to elevated levels of contaminants within the surface water at sampling site HHG000106. Eight samples were collect.

At the time of the sample collection, work was being undertaken on developing the new irrigation area at the site, however no other activities were taking place. The streams were in moderate flow conditions following some rain in the days preceding this sampling run. No obvious signs of contamination were detected about sampling site HHG000106 or upstream of that point.

12 April 2021

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

An inspection was undertaken at the site to assess compliance with resource consent conditions. The inspection found that there had been limited use of the drop off pit adjacent to the drilling mud pad with only egg waste being deposited here. Conversations held with staff on site indicated that consideration was being given to how they can utilise the main composting pad and what enhancements to infrastructure would be required to allow egg waste to be deposited directly onto the composting pad.

The truck wash pit had been cleaned out with all the material deposited back onto the drilling mud pad for composting. This was the only appropriate course of action as the wash bay contained contaminants from the previous acceptance of drilling mud material to the site.

Discussion was held about completely cleaning out the drop off pad and the treatment ponds leading to the irrigation pond, associated with the drilling mud pad. It was recommended that as these pits appeared to be redundant, that they are cleaned out and filled in, as an action to minimise diffuse odour discharges. It was conveyed that should the decision be made to fill in the ponds, the Company should contact the Regional Council to make sure that correct procedure was followed to decontaminate the ponds prior to infilling. Which every decision was made it was strongly recommended that the ponds are de-sludged.

An inspection of the composting pad found that it was well defined with all product held in designated wind-rows. An inspection of the paunch pond found that sufficient free board was available within the pond. No pumping to the wetland treatment system was occurring at the time of the inspection. The wetland treatment system was not discharging.

An inspection of the drilling mud pad found that it was well contained with all stormwater captured and directed to the irrigation pond. Work was required to make sure that stormwater does not pool within the ring drain.

A timeline was requested, as to when this work could be achieved, noting that the irrigation area enhancement works were largely complete. It was also requested to undertake an inspection of all the cut-off drains at the perimeter of the irrigation areas, to make sure that all surface water was intercepted and allowed to travel freely down the drain rather than overtop into the irrigation areas.

It was suggested that this was required to be completed prior to the onset of winter to make sure that no surface water / overland pathways occur, as a result, as well as to allow for applications of irrigation.

Work to establish a new irrigation area were complete, with the area being seeded, good grass strike appeared to have occurred. Further growth will be required before the area is able to be used for irrigation, however conversations will be held with the Site Manager, as to when the grass growth is to a standard that will allow the area to be used for irrigation.

At the time of the inspection the irrigation area adjacent to the access track (below the twin culverts) was being utilised for spray irrigation. The application rate appeared appropriate with no signs of overland flow.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection found that there was a light wind which was generally blowing up the valley at the time of the inspection, therefore no odours were detected at the State Highway. During the inspection a mobile gas detection device was deployed at the property to measure emissions.

An inspection of the site found that all worm beds were covered with no odours being detected about the beds. A light odour was noted about the paunch pad, however this was largely confined to that immediate area. The truck wash pad had been cleaned out and as a result the odours being emitted from this area had significantly reduced from the previous inspection. Odours were also noted about the drop off pit and treatment ponds adjacent to the drilling mud pad.

As discussed in inspection notice for consent 5838-2 - there are options to be considered by the Company to minimise odour from this location. A composting type odour was detected about the composting pad / windrows. Consideration should be given to what actions could be taken to reduce odours from the windrows, especially during and immediately following the mechanical turning of these rows.

30 April 2021

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

An inspection of the re-aligned section of the Haehanga Stream found that the banks were visibly stable with all stock being excluded from the area, thus increasing bank stability. The banks were well vegetated and will require to be planted going forward.

The Haehanga Stream was in moderate flow conditions at the time of inspection. The stream was flowing freely with no signs of blockages and / or obstructions. No significant headward erosion was noted. No issues identified at the time of inspection.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the large culvert beneath the access track leading to the worm beds found that it was open and free of any blockages and/or obstructions. There were no signs of erosion about the culvert with stable headwalls on either side. Some work had been undertaken to increase the static water level through the culvert. However this assessment, being the first reasonable assessment in moderate flow conditions, found that some further works were required to lift the static water level. To make sure that the culvert was not a barrier to fish passage.

Further placement of rocks downstream, in a graduated series of riffles (as undertaken further downstream at the twin culverts) may assist to allow sufficient static water level throughout the length of the culvert.

This will be discussed with the General Manager on the next site visit. The culvert adjacent to the access track in this same location had a good level of water through the culvert and no issues were identified.

The uppermost culvert beneath the access track, at the entrance to the upper irrigation area was found to be very good with a nice static water level (approx. 200mm) throughout the length of the culvert. This resulted in a low flow velocity so that fish passage was not obstructed.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

The inspection was undertaken in fine weather conditions with 9 °C and 7/8 cloud cover. A very slight cold air drainage condition was observed at the site entrance with air flow moving slowly down the valley the facility is located. Cold air drainage was also observed within the Uruti valley, with the general air mass moving down the valley in a south-west direction along the valley floor.

The mass air movement could be observed by noting the fog as it moved along the northern edge of the Uruti valley. It was noted that there had been light rain overnight prior to the inspection and therefore the gravel access track was damp.

An odour survey at the site boundary did not detect any odours associated with the composting facility. On arrival at the site office, some odour was noted. It appeared that this odour had moved down the valley during my inspection as this was not noted upon first arrival at the site office. In response to this odour the deodoriser was activated.

The odour was low in intensity and strength. In discussions with site operators it was thought that this may have been generated from some movement of material that morning. The odour was noticeable for approximately 10-15 minutes and after that no further odours were noted about the site other than the operational areas further up the valley.

No irrigation was taking place at the time of the inspection and no aeration of the irrigation pond was occurring either. An assessment of the odour about the irrigation pond found only a very slight sulphur type odour which one was required to concentrate to be able to detect.

Composting odour was noted about the composting pad with some further odours noted about the truck wash / drop-off pit area. The General Manager advised that some de-sludging of the treatment ponds and irrigation pond were proposed to be undertaken in the coming weeks to maintain compliance with resource consent conditions.

A new aerator had been purchased and this will be established within the irrigation pond following its de-silting. A second deodoriser had also been purchased and installed at the facility. This device had been installed adjacent to the duck pond. This piece of equipment had the ability to disperse a water vapour cloud across the valley floor from the duck pond to the eastern side of the valley.

This deodoriser was still being fine-tuned to make sure that it operated as effectively as possible. An inspection of the worm beds found that they were all covered with no odours detected about these areas. A slight odour was noted about the paunch pad which was consistent in intensity as per previous inspections. This odour quickly dissipated and was only noted within the immediate vicinity of the storage area.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

At the time of the inspection the quarry extracting site and the associated access track were not in use and had not been used for an extended period of time. This lack of use had resulted in vegetation growing about the extraction area and on sections of the access track. The vegetation appeared to assist with stabilisation and reduced the mobility of sediment.

Cut-off drains remained in place on the access track, to make sure that any stormwater was quickly directed off the access track and was not allowed to flow down the track, where riling would quickly become an issue. The bund at the base of the track remained in place.

Please note that should the access track and quarry extraction area become operational again then a reasonable amount of sediment control works would need to be carried out prior to the site becoming operational again.

This would include but not be limited to improved stormwater management on the access track and sediment treatment devices established on the quarry platform. It was communicated for the Company to make contact prior to recommencement of operations at the quarry, to make sure that all conditions are satisfied prior to the commencement of extraction activities.

5838-2.2 To discharge:

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

The inspection was undertaken in fine weather conditions with light rain the previous evening. At the time of the inspection the Haehanga Stream was flowing at a moderate (or slightly below) level. A full surface water sampling run was undertaken during the inspection.

The inspection found that the newly constructed irrigation area had been completed and seeded with a good grass strike. Some young stock (calves) were grazing on this area (noted no irrigation had occurred in this area). The intention here is to allow the young stock to lightly graze the fresh pasture to encourage it to thicken up at the base.

The re-aligned section of the unnamed tributary of the Haehanga Stream appeared stable with no signs of erosion or bank slippage. Riparian planting of the re-aligned section of stream and an associated wetland are due to be completed (or commenced with regards to the wetland) this winter to make sure of compliance with resource consent conditions.

The new culvert had been installed below the site access track, to replace the previously perched culvert that was draining the stream from the aforementioned catchment. Some further work was required to complete the culvert, in accordance with resource consent conditions, and these works were being undertaken at the time of the inspection.

No irrigation was taking place at the time of the inspection, however an inspection of the irrigation paddocks found that they all had good grass cover and that they were in a position to receive irrigation fluid if required. Please note - there had been some slips and blockages in the surface drains about the outsides of some of the irrigation paddocks. These drains are required to be

cleaned out as soon as possible, to make sure that no clean surface water is discharged across the irrigation paddocks, as a result of the blocked drains. An inspection to confirm the completion of these works will be undertaken at the next inspection. An inspection of the 'duck pond' found that it was full with approximately 30cm free board remaining.

Works had been undertaken within the ring drain at the lower end of the drilling mud pad. This work had lifted the base of the ring drain to make sure that stormwater had been captured and directed to the irrigation pond rather than being allowed to pond or pool within the ring drain. While this work had largely been successful, there remained some amount of ponding within the drain running adjacent to the Haehanga Stream. This was communicated to site staff. However, generally speaking, this work had resulted in the drain being significantly better than was the case previously.

An inspection of the irrigation pond found that no aeration or irrigation was taking place from the pond. There was about 0.75m freeboard within the pond to cope with any in flows. As mentioned in the air discharge consent inspection, a (purportedly) more appropriate aerator had been purchased and proposed to be installed within the irrigation pond in the coming weeks.

All the treatment pond were proposed to be cleaned out via a long reach digger prior to the aerator placement in the pond. De-silting of the ponds will also make sure that capacity was maintained and potentially reduce the odour emissions from the ponds.

An inspection of the drilling mud pad found that the drop-off pit was still being used to receive egg waste with small volumes of sawdust being added to assist in dealing with the egg waste. Although the pit was being used in a limited nature, an inspection found that there was still a reasonable volume of aged solid waste material within the length of the pit.

It was communicated to undertake works to give the pit a complete clean out so that all the solid waste material was removed and allowed to compost rather than decompose within a wetted environment. This is a source of odours at the property. Cleaning out the pit has the potential to alleviate some of the odours and may assist in improving the quality of the irrigation fluid within the irrigation pond.

The top end of the drilling mud pad was well defined with a small drain placed to make sure that all stormwater from about the drop off area was collected and directed to the irrigation pond. An inspection of the wind rows found that they were well-defined and in a logical order. At the time more work was being undertaken on site to make sure that these wind rows were better managed, apparently to help in the composting process and mitigation of odour. This included the monitoring of temperature and oxygen levels within the rows, the regular turning of the rows and managing the size of the rows to make sure that they do not get to big.

The effectiveness of these measures will be determined by the reduction of odour over time. It was also noted that the deposition of product onto pad 1 blocks the ring drain and causes the stormwater and leachate to back up within the ring drain, as it is unable to get to the irrigation pond. Site staff were advised of this issue and advised to make sure that the ring drain is redefined and cleared after the inward product had been deposited at the site.

An inspection of the worm beds found that they were all covered. No recent activity had occurred about the worm beds. The paunch pond was found to have approximately 1.5m free board within the pond and the area about the drop -off point to the pond had been redefined. This was proposed to make sure that all stormwater was captured, and then able to flow into the wider pond area, to be stored, prior to pumping into the wetland treatment system.

An inspection of the wetland treatment system found that there was a slight discharge (at 1litre per 13 seconds) with the discharge described as a tannin colour. It was communicated that prior to the next inspection to please make sure that the surface drains about the irrigation paddocks were cleaned out. Also the ring drain about the drop off area on Pad 1 around the windrows, is managed and defined. The drop-off pit adjacent to the drilling mud pad is cleaned out to make sure the aged solid waste material has been removed.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

An inspection of the twin culverts beneath the site access track found that both culverts were open and free of any blockages and or obstructions, with water flowing evenly through both culverts. The headwalls appeared stable and secure with no signs of accelerated erosion about the entry or exit points to the culverts.

The rock riffles placed upon the stream bed, downstream of the works, were working well, the static water level was sitting above the base of the culvert to allow for fish passage. It was noted that stock are excluded from the stream banks, which assists with bank stability. No issues were identified at the time of inspection.

2 June 2021

6211-1 To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes

The inspection undertaken in fine weather conditions. The Haehanga Stream at the time of the inspection was flowing freely through the realigned section of stream. There were no obstructions or blockages within the realigned section of stream.

Minimal bank erosion was observed in the lower section of the alignment. No signs of headward erosion. No issues identified at the time of inspection.

6212-1 To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes

An inspection of the culvert beneath the track leading to the lower worm beds found that it was free of any blockages and/or obstructions and was free flowing. The headwalls were in place and secure, with no signs of erosion about the culvert.

The stream was flowing at a depth of approximately 5-10cm through the culvert. Some works had been undertaken, to better enable fish passage through the culvert, by removing the fast flowing water discharging over hard rock at the outlet of the culvert. This aspect may require some further work, however confirmation of this will be provided at the June inspection after consultation with the Council's freshwater biologist.

5839-2 To discharge emissions into the air, namely odour and dust, from composting operations

At the time of the inspection the general air temperature was 4°C with 8/8 high cloud cover. A heavy dew was noted, however there had been no rain in the period preceding the inspection. Upon arrival at the site an odour complaint was received by the Council.

An odour survey was undertaken at the site boundary upon arrival at the site. The survey found that no odours were detected at the site entrance nor at the metal pit to the immediate south of the State Highway road bridge. A walk along the roadside did not detect any odours from the facility.

A further odour survey was undertaken to the north of the site within the Uruti Valley. At this time a very light misty rain fell for approximately three to five minutes. The inspection found that the area within the Uruti Valley to the north was upwind of the site due to cold air drainage conditions. No odours were detected north of the facility.

A further survey was undertaken at the site office with no odour detected. A slight odour was detected about the twin culverts. This odour was faint within the irrigation paddock below the culverts on the western bank.

While the inspection was taking place a second odour complaint was received by Council. The complaint related to odours within the Uruti Valley to the south of the site. This complaint related to burning tyre and then a chemical type smell.

Upon receipt of the complaint, a further off-site inspection was undertaken within the Uruti Valley, to the south and at the complainants address. No odours of any description were detected beyond the site boundary. (Incidents IN/42667 & IN/42668 relate to these two complaints).

Further site inspections found that the irrigation pond was not being aerated and a very faint odour was detected in the general area. An inspection across the top of the solids drilling mud pad found that the only odours emitted from the solids pile appeared to be at the top end where the composting process was being carried out from the recent addition of material.

As noted, there were passive odours detected about the drop off pit of the drilling mud pad. The proposed filling of these initial receiving pits and treatment pits may well assist to help control passive odour emissions from the site.

Some odour was also detected about the composting windrows, and while these were noticeable, at the time of the inspection it was not considered intense. All worm beds were covered on the site. The two deodorisers were also established on site, however neither were being operated at the time of the inspection.

10063-1 To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream

The inspection found that no works were being undertaken at the quarry site and no works had been undertaken at the site for an extended number of months. As a process the site had naturally stabilised with vegetation to a large degree.

It was communicated that if a decision was made to re-access the quarry site and associated quarry access track, the Company would need to make contact with the Council prior to the commencement of works. Whereby a discussion regarding appropriate sediment controls and

associated stormwater management can be held, to make sure it is to a standard to treat stormwater from fresh soil/earth disturbance.

5838-2.2 *To discharge:*

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

An inspection of the composting facility was undertaken as part of routine compliance monitoring. The inspection was carried out in dry weather conditions. An inspection of the Haehanga Stream found that it was flowing freely and reasonably clear. It was estimated that the Haehanga Stream flowing below the seasonal average.

An inspection of the Haehanga Stream was undertaken at several locations throughout the catchment, extending to the top of the wetland treatment system and downstream to beneath the State Highway Bridge. No plastic contamination was observed at any of the locations and no weasand clips were located within the stream or on the stream banks.

The turbidity of the stream generally decreased up the catchment, however there were no specific points of influence that created a sudden change in turbidity. The inspection found that the lowermost irrigation area was being grazed with a handful of young stock. A good grass cover had established across the irrigation area. The General Manager communicated the intention was to remove the stock from the new lower irrigation area, then to install the irrigation lines and associated irrigators. Once this had been undertaken, the Company would then commence irrigation activities across the area, once the grass cover had reached an appropriate level.

The inspection of the stream re-alignment, adjacent to the newly constructed lower irrigation area, found that it was reasonably stable throughout its length. There was a small slumping event that had occurred immediately above the new culvert, however it was recommended that this be left in place and monitored. Should it become an issue then it should be cleaned out, however at this stage it is not resulting in the mobilisation of sediment and therefore leaving it in place may be more appropriate.

The irrigation areas below the twin culverts, on both sides of the stream were found to be damp underfoot but not sodden, with no pooling or ponding observed. The ring drains about the irrigation paddock, on the true left bank, below the twin culverts and on true right bank, opposite the duck pond, had both been cleaned out. This allowed clean stormwater to be captured and directed away from the irrigation areas and not across them.

Some further work was planned to be undertaken on the upper ring drain, above the uppermost irrigation area. This was an ongoing maintenance issue, as the drain was not currently operating as designed.

An inspection of the duck pond found that it was full but not overflowing. Some free-board remained within the duck pond, however it was suggested that this should be monitored over the winter months to make sure that it did not overflow to land or water. Approximately 1m free-board was observed within the irrigation pond. Two aerators had been purchased by the operators and were onsite. The intention was to place the larger of the two into the irrigation pond, however at the

time, the smaller of the two had been placed within the irrigation pond. This was proposed to suffice until some additional maintenance and further equipment was established onsite to enable the larger aerator to be operated within the irrigation pond.

The ring drain about the solid drilling mud pad was open and free flowing. Minimal ponding was observed within the ring drain, however a little further work was required to contour the drain to prevent the small amount of pooling that remained on the northern side of the ring drain.

The drop off pit remained full of material and the pit was still used to receive egg waste to site. This material was then placed onto the solid drilling mud pile. A discussion was held with the General Manager and he was advised that this pit should be cleaned out, with all solid material removed and placed on the drilling mud pad, and then filled in.

It was suggested that the removal of this pit from the facility may well aid in a reduction in the passive odours which are neutered frequently in this area of the site. It may also help lower the nitrogen concentration within the irrigation fluid.

An inspection about the composting windrows found that they were all being turned on a regular basis. It was suggested to please make sure that a good cover of greenwaste was applied to the sheep skins and that they are blended with greenwaste as soon as they arrive at site, in order to minimise passive odour emissions.

The ring drain about the composting pad was well defined, all stormwater was captured and directed to the irrigation pond. All worm beds on site were covered. Works had been undertaken about the upper end of the paunch pond. This work had increased the bund adjacent to the pump location. It had also resulted in a slight decrease in the catchment size of the pond.

It was recommended that the pond was further decreased in size. This may result in less contaminated stormwater collected and therefore less pumping to the wetland will be required. A reduction of contaminated stormwater into the wetland treatment system may result in an increased retention time within the treatment system. This may also increase the opportunity to circulate the contents of the treatment system more frequently to improve water quality before discharging it into the receiving environment.

The wetland treatment system was discharging at the time of inspection. The discharge was observed to be light in colour with no foaming or discolouration noted within the receiving environment as a result of the discharge.

5938-2 To use a twin culvert in the Haehanga Stream for vehicle access purposes

The inspection found that the Haehanga Stream was flow freely through the twin culverts at a low velocity. There was sufficient water depth within the culverts to allow for fish passage. No issues were identified at the time of inspection.

16 June 2021

5838-2.2 To discharge:

a) waste material to land for composting; and

b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream

A site visit was undertaken at the Uruti composting facility in relation to an investigation into the nature of the saw-dust accepted to and disposed of at the composting facility. This was due to the discovery of Light Organic Solvent Preserved (LOSP) material disposed of at a South Taranaki Landfarm.

Three saw dust samples were collected from the site. One sample of fresh sawdust was collected near the drop-off point of the composting windrows, while two further samples were taken from the large pile of stockpiled sawdust, at the top end of the composting pad. Note - An odour complaint was received during the site visit - details of which are recorded on an incident register (IN/42736 relates).